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TROPICAL DISEASES BULLETIN

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

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SUMMARY OF RECENT ABSTRACTS.*

VII. HELMINTHIASIS.

General.

FAUST *et al.* (p. 144) report a preliminary investigation on the efficiency of various techniques for the examination of faeces for protozoan cysts and helminth eggs. The highest counts were obtained by direct counting in iodine solution of known volumes of homogeneous emulsions, and by a direct centrifugal floatation method using zinc sulphate solution of specific gravity 1,180 as the diluting fluid. Further work was in progress at the time of reporting, and reference to later results may be made to this *Bulletin*, 1940, Vol. 37, p. 62, and to a critical assessment by LANE of the methods used, this *Bulletin*, 1940, Vol. 37, p. 477. D'ANTONI and ODOM (p. 829) investigated the proportion of hookworm eggs held back by a metal sieve of 60 meshes to the linear inch, when faecal suspensions were strained through it. They estimate that with the faeces of a patient on normal diet the percentage of eggs remaining in the sieve is about 2·5. In comment LANE points out that a sieve of 100 meshes to the linear inch holds back from 35 to 60 per cent. of eggs even when tested by the levitation method, which itself is inadequate to show as high a proportion of eggs as the D.C.F.F. technique. He also draws attention to the fact that hookworm eggs are sticky in watery solution. SAWITZ *et al.* (p. 830) estimate the specific gravity of Necator eggs as about 1,055 (roughly, for practical purposes) but LANE states that for dependable floatation a solution of specific gravity 1,100 is inadequate, and 1,150 is necessary. ANDREWS (p. 594) gives in a table results showing the comparative values of several methods of detecting worm eggs in faeces.

POKROVSKY and ZIMA (p. 589) found worm eggs on 0·47 per cent. of 1,911 flies in Russia, principally on their legs.

CULBERTSON (p. 590), summing up modern views on the subject of immunity to helminths states that most workers tend to assume the point of view that immunity is developed and that the humoral and cellular responses of the host are similar to those associated with

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1939, Vol. 36. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

other infectious agents. AFRICA and DE LEON (p. 589) studied the tissue reactions which occurred after the intraperitoneal injection of certain worm eggs into *Macacus cynomolgus*, and, in the case of *Schistosoma japonicum*, in human tissues. With eggs of Ascaris, *Fasciola gigantica* and *S. japonicum*, formation of giant cells took place and these cells, in the case of Ascaris, engulfed the eggs, especially if embryonated, causing them to disappear. In the case of Fasciola the giant cells appear to exert pressure on or to penetrate into the egg, either crumpling or bursting it, and with Schistosoma there is fracture of the shell, pressure upon it and a tearing action. Heterophyid eggs do not evoke giant cells, but only histiocytes and endotheliocytes. The authors attribute this to negative chemotaxis.

Surveys of helminthic infestation in various parts of the world are reported on pp. 35, 36, 144 (by post-mortem), 591 (twice, once by post-mortem), 592 (twice), 593 (three times), 594 (twice) and 618. These cannot be abstracted and are principally of local interest.

Trematodes.

Schistosomes.—GOPSILL (p. 38) reports heavy incidence of *S. haematobium* and *S. mansoni* infection in the flat country bordering Lake Nyasa. As no Planorbis snails could be found and as penetration of *Limnaea laurenti* by miracidia of *S. mansoni* was observed it appears probable that this snail may be responsible for transmission of *S. mansoni*. *Bulinus africanus* (*Ph. africana*) is probably the intermediate host of *S. haematobium*. Intravenous antimony tartrate is the most effective treatment.

Discussing schistosomiasis (and ankylostomiasis) in Egypt, SCOTT and BARLOW (p. 36) show that there are found fluctuations in prevalence and intensity of infection which cannot be correlated with known causes. Greater changes, however, all in the direction of reduction, have followed the administration of as much treatment as the people could be persuaded to take. Bore-hole latrines have not apparently been effective in reducing incidence, but it is pointed out that these are usually constructed in villages, and since infection is only transmitted under field conditions it can hardly be expected that house sanitation can affect it significantly. The people should therefore be taught to accept and use latrines in the field, and should be educated to avoid pollution of water; these measures should be associated with snail control, and drug treatment, though only temporarily effective, should not be abandoned.

MARTINS and DOS ANJOS (p. 618) believe that schistosomiasis has recently been introduced into the N.E. region of Brazil, and found incidence varying from 3·22 per cent. to as much as 85·18 per cent. in parts of the State of Minas Geraes. The general incidence was 28·73 per cent. In Bello Horizonte, MARTINS and VERSIANI (p. 39) identified *Australorbis glabratus* as an intermediate host of *S. mansoni*. HOFFMAN (p. 619) as a result of careful observations concludes that *Planorbis corneus* cannot be infected with miracidia of *S. mansoni*. The snail has been introduced into aquaria in Porto Rico in place of *P. glabratus* which is a known host of the schistosome.

MAINZER (p. 39) claims that bilharzial asthma is an allergic phenomenon dependent upon constitutional factors and substances liberated by *S. haematobium* or *S. mansoni*. It does not depend on lesions of the lungs brought about by the parasite since pulmonary infection is constantly found in schistosomiasis, and the allergic nature of the condition is

shown by its association with urticaria and by its hereditary transmission. That it is due to schistosome infection is demonstrated by the complete parallelism in the course of the two conditions after specific therapy. He (p. 620) describes the X-ray appearance of pulmonary schistosomiasis: distinct foci varying in size, density and distribution, increased striation, enlarged and intensified hilar shadows. Cough, fever and wasting may simulate tuberculosis and after the destruction of the parasites contracting fibrosis may constrict bronchioles or vessels.

Mainzer (p. 620) states that increase in blood eosinophilia after antimony treatment in a suspected case of schistosomiasis favours a diagnosis of that condition.

El Gazayerli (p. 619) found a male schistosome in the circumflex branch of the left coronary artery of a patient in Egypt who had died of meningitis. Bilharzial lesions were present in the lungs, rectum, appendix and urinary organs, but eggs of *S. haematobium* only were found in scrapings.

Cawston (p. 620) draws attention to the danger of passing a cystoscope in a patient with untreated schistosomiasis; most cases of bacterial infection can be traced to this procedure. He states that a solution of tablets containing tartar emetic and sodium chloride which has been filtered before sterilization is far less likely to produce coughing on intravenous injection than one which is not filtered. Diamantis (p. 622) advocates a mixed antimony and emetine treatment in quantities below the lethal dose of each and emphasizes the sudden and unforeseen character of the many antimony deaths in Egypt. Kunert (p. 622) reports on the results of sodium antimony tartrate treatment.

Ashkar (p. 621) reports considerable success in a small series of patients treated with anthiomaline. The drug was given intramuscularly in 6 per cent. solution and the dose was raised at the third injection to 1·0 cc. for each 15 kgm. body weight, given usually every other day. It is more toxic than fouadin and may produce unpleasant symptoms which, however, are usually not serious. Impallomeni (p. 621) has used Stibional B with success, in doses rising to 10 cc. intravenously and given on days 1, 2, 3, 5, 6 and 7, or longer if necessary. It may produce temporary fever but appears to be efficient. In urinary schistosomiasis David (p. 622) reports that Dicuprene and Cuproquine were unsuccessful.

Williams (p. 38) reports schistosomiasis from part of Szechwan Province not hitherto known as an endemic area. Eggs were found in an excised appendix, and Oncomelania snails were found in the area in question.

Tang (p. 37) reports on the morphology of the miracidium and cercaria of *S. japoncium*. Adult *S. japonicum* were maintained alive by Hoeppli *et al.* (p. 35) for five months at 37°C. in horse serum either pure or diluted with Tyrode solution, and were used in experiments on the effect of drugs on their survival time.

Campbell (p. 40) suggests that a large proportion of *oriental* cases diagnosed as splenic anaemia, Banti's disease, cryptogenic splenomegaly, etc., may in fact be due to schistosomiasis. That eggs cannot be found in the stools is not adequate evidence against their presence in the intestine since they may be recovered by duodenal sound in such patients. The first step in the operation of splenectomy should be the

immediate examination of frozen liver tissue for schistosome eggs. If these are found splenectomy should not be performed.

For the control of *S. japonicum* infection, MIYAJIMA (p. 623) advocates, for *Oncomelania nosophora* in water, the damming up of ditches for 24 hours and the addition of quicklime to make a 1 per cent. solution, and for these snails in mud the application of a steam jet. These measures have been followed by a notable reduction in infected persons.

BUCKLEY (p. 40) describes a form of dermatitis found in Malaya and caused by *Schistosoma spindale*. The wearing of boots and putties may prevent the itch.

Other trematodes.—In stool examinations in Canton OTTO *et al.* (p. 41) found 48·6 per cent. infections with *Clonorchis sinensis*; eosinophilia is a feature. *C. sinensis* has been found by KOURI *et al.* (p. 626) in from 23 to 49 per cent. of Chinese in Cuba. NIETO ROARO and CABALLERO (p. 624) have also found it in Chinese in Mexico, and discuss the possibility of its transmission. The fish hosts are present, but Bithynia is not found. HOEPPLI *et al.* (p. 35) used a mixture of serum and Tyrode solution, or undiluted heparinized rabbit plasma for maintaining adult *C. sinensis* alive at 37°C. during experiments on the effect of drugs on the fluke. Survival for five months was achieved when the medium was changed weekly. Metacercariae lived as long as two weeks but no development occurred.

Leucogobia gracilis (OKABE, p. 40) and *Cultriculus kneri* (MUTO, p. 624) have been reported as second intermediate hosts of *C. sinensis*.

KINUGASA (p. 624) reports that fouadin is useful in the treatment of *C. sinensis* infections. Studying *C. sinensis in vitro*, CHU (p. 625) found that gentian violet, malachite green and Nile blue were lethal in 24 hours in a concentration of 1/40,000, which approaches a concentration which might be used for treatment *in vivo*. Of these gentian violet was the most effective.

Human infection with *F. hepatica* has been known in Cuba since 1931 and KOURI *et al.* (p. 626) note that a single examination of faeces is not enough to exclude the presence of the fluke. Emetine is specific but may fail, probably owing to fibrous encapsulation of the worm. BACIGALUPO (p. 626) shows that *Limnaea viatrix* is an effective host of *F. hepatica* in Cuba. RODRÍGUEZ-MOLINA and HOFFMAN (p. 40) report two cases of infection with *Fasciola hepatica*; one was apparently cured with emetine. MANCEAUX and ALCAY (p. 626) note eosinophilia of 21 to 28 per cent. in a case of infection with *F. hepatica* in which symptoms of appendicitis were present. The infection did not respond to emetine. BÜRGI (p. 626) describes infection with *F. hepatica* in a child.

AZIM (p. 626) found heterophyids in 59 to 75 per cent. of dogs, and in 90 per cent. of cats in Egypt. VAZQUEZ-COLET and AFRICA (p. 42) name fish intermediate hosts of *Monorchotrema yokogawai* and *Diorchitrema pseudocirrata*.

BUCKLEY (p. 627) found *Fasciolopsis buskii* in 59·7 per cent. of persons in a district of Assam, and showed experimentally that *Segmentina trochoideus* is an intermediate host.

Infection with Paragonimus was found by KINUGASA (p. 627) in schools in the Sintiku Prefecture to vary from 0 to 6·25 per cent. Wasting, cough, haemoptysis, pain, weakness and asthma were common symptoms and the intellectual powers were affected. Children of fishmongers were more often infected than others.

Gastrodiscoides hominis is present in 41·2 per cent. of the population of part of Assam. BUCKLEY (p. 627) reports that soap and water enemata are effective in removing the worms, but was unable to find the snail hosts.

VAN DEN BERGHE and DENECKE (p. 628) report infection with *Dicrocoelium dendriticum* in two Europeans in the Belgian Congo, but none in the natives, though local monkeys have been found infected. The infection has not been looked for in sheep or snails. It was probably acquired through eating uncooked vegetables.

Cestodes.

Cyclophyllidea.—VILJOEN (p. 254) reports the incidence of measles in swine and cattle in the Union of S. Africa and the common anatomical site of the infections. *C. cellulosae* frozen for five days was not viable but for safety freezing at —10°C. for seven days is advised if the carcass is not too fat, or for 14 days for greater certainty. Treatment of human carriers of worms and close inspection of abattoirs are recommended for eradication.

DE SÈZE *et al.* (p. 253) state that, in the examination of the cerebrospinal fluid, excess of lymphocytes, positive colloidal benzoin reaction in the first 10 or 12 tubes, and eosinophilia, in the absence of a positive Wassermann, indicate a definite diagnosis of cerebrospinal cysticercosis. An editorial note gives the details of the colloidal benzoin reaction. HARE (p. 252) reports two cases of cerebral cysticercosis with epileptiform fits and a condition of hydrocephalus.

CASTELLANI and ACANFORA (p. 254) report massive cysticercosis in the skin, heart and brain of a girl who developed tachycardia and died in an epileptic attack. They refer to a case of luetic pseudocysticercosis which disappeared under treatment with neoarsphenamine. EVANS (p. 719) reports a patient, with a massive cysticercosis and a history of epilepsy, who had a remarkable athletic record and whose physical powers were apparently not affected by the condition. SEGAL (p. 719) reports a case of cysticercosis of the right iliac bone, at first diagnosed as chronic osteomyelitis. HIYEDA and TERADA (p. 717) report favourably on further experience with Raigan (*Omphalia lapidescens*), a kind of mushroom used in the powdered state in doses of 20 grains three times a day for three days, without preparatory treatment or purgatives, in the treatment of infection with *T. solium*, *T. saginata*, *H. nana* and *H. diminuta*. The dose of the extracted active principle is 0·4 grain, but its nature has not yet been determined.

BARNETT (p. 251) gives figures of the incidence of and deaths from hydatid infection in Australia and New Zealand during 1937, with particulars of the anatomical distribution.

CHUNG and T'UNG (p. 715) state that both the Ghedini-Weinberg complement fixation reaction and the Casoni intradermal test are group immunological reactions rather than specific tests, since both may be positive in either hydatid disease or cysticercosis, whether hydatid or cysticercus fluid is used as antigen. The fluid should be diluted 1 : 4 for the complement fixation test, since undiluted fluid often gives false positives in syphilis or other conditions ; the serum of patients with kala azar may give a positive result even with fluid diluted 1 : 8, and this disease must be borne in mind, therefore, in evaluating a positive result. SERGENT *et al.* (p. 716) on the other hand

consider that a positive Casoni reaction to fluid containing no antiseptic, at the first injection, is definite evidence of hydatid disease. Positive results to repeated injections may be obtained in patients in whom there is subsequently found no post-mortem evidence of infection and they are presumably caused by sensitization arising from the earlier injections.

In the diagnosis of *Echinococcus alveolaris*, BÜHLER and v. HASSELBACH (p. 715) refer to certain points : the tumour in the liver is not associated with any other to which it could be secondary, there may be deep jaundice with comparatively slight subjective troubles, there is eosinophilia, X-ray evidence of calcification and an unusually long history. Only histological examination, however, can give a definite diagnosis. FRIEDRICH (p. 252) shows that *Echinococcus alveolaris* is not so rare as is thought and should be suspected in any patient with wasting and a painful liver swelling which resembles malignant disease but does not behave like a true malignant tumour.

ROGERS and TUDHOPE (p. 253) report successful removal from the spinal canal of a hydatid which had been causing paresis and paraesthesia ; they note that the site of election is usually extradural and posterior and that this accessible situation is suitable for operation.

Several papers dealing with the purely clinical aspect of hydatid disease have also been abstracted, but as they contain no new information they are not included here.

BEARUP and MORGAN (p. 721) report three human infections with *H. diminuta* and two with *D. caninum* in children in Australia.

LIDDO (p. 721) reports one human infection with *H. diminuta* in S. Italy and BACIGALUPO and AGUIRRE PEQUENO (p. 251) a second case of infection with *H. diminuta* in Mexico.

KOURÍ and DOVAL (p. 720) record infection by Davainea in three children ; the species was not determined. Treatment with male fern and carbon tetrachloride was successful in one case.

LEÓN (p. 720) reports 9 cases of human infection with *Raillietina quitensis* in Ecuador and describes the worm. The definitive host is man but the intermediate host is as yet unknown. Symptoms produced include abdominal pain, nausea, diarrhoea, weakness, headache, vertigo and mental dullness.

ROY (p. 255) in Bengal reports the twelfth recorded case of human infection with *Bertiella studeri*.

Pseudophyllidea.—In an investigation of the pathogenesis of Diphyllobothrium anaemia TÖTTERMAN (p. 248) shows that the administration of dried worm or an alcoholic extract of dried worm to patients with a history of this anaemia caused a sharp fall in the number of red cells to as low as a million, but that the haemoglobin did not fall proportionately, the colour index therefore rising. On cessation of administration of the preparations the blood condition improved. Actual infection in these patients produced the same effect. The fact that the residue of the worm powder after alcoholic extraction did not produce this effect shows that it is the alcohol-soluble fraction which is responsible, and the extract does not influence the blood of persons with normal blood or cryptogenic pernicious anaemia. The author concludes that the alcohol-soluble components of the worm may produce hypersensitiveness and that the mechanism of production of the anti-pernicious factor is weakened, so that this affection may supervene. In serological examination of the patients investigated by Tötterman, SIEVERS (p. 249) found that complement fixation reactions

can usually be obtained in persons who have previously suffered from Diphyllobothrium anaemia and to whom worm substance or alcoholic extract of worm powder is administered *per os*, but not after the administration of the residue left after alcohol extraction only. This reaction is independent of the Wassermann reaction. The period during which the reaction is positive is very brief and is not related to the symptoms of anaemia. The reaction is negative in normal controls but may occur in pernicious anaemia.

As has been reported before, MUELLER (p. 250) differentiates *Diphyllobothrium mansonoides* from *D. mansoni*. He now traces the history of the plerocercoid larvae when swallowed by a host in which it does not become adult. It penetrates the intestinal wall and reaches muscle, where it continues to grow. Monkeys harbouring large numbers of these plerocercoids may develop gelatinous swelling of the lower part of the trunk due to burrowing and disintegration of the sparganum in subcutaneous tissues, but if the monkeys have been given injections of tape worm substance this does not occur and the plerocercoids are promptly encapsulated. Eosinophilia to 35 per cent. may occur. He suggests that *Sparganum proliferum* is an aberrant form of *S. mansoni* or *S. mansonoides*. CORNET (p. 250) advocates surgical measures in the treatment of ocular sparganosis in preference to intravenous injections of novarsenobenzol; in accessible sites surgical treatment is rapid and sure, but for retrobulbar infection it may be necessary to inject alcohol or to attract the parasite to superficial sites by applied heat. Acute inflammation indicates bacterial infection. MEIJER (p. 717) states that *D. erinacei* (*D. mansoni* or *D. railleti*) is present in different parts of the Dutch East Indies. It is found in dogs and cats and the plerocercoid occurs in frogs, rats, swine and shrews. PETROV (p. 721) reports the first human case of infection with *Diphyllobothrium skrjabini*, a parasite of dogs, and with a new species named *D. nenzi*. *C. Wilcocks.*

[*To be continued.*]

YELLOW FEVER.

Précis of Abstracts in this Section.

In the Gold Coast MACKAY (p. 549) reports that 4 out of 5 European cases were apparently contracted in rural areas where mosquito control is impossible, but local investigations in these areas failed to disclose any extensive incidence. Mosquito control continues along trade routes, and it is realized that with increasing traffic land spread, though slower than air spread, may be more sure. Particular attention is paid to breeding places in tree holes and the importance of vaccination of all Europeans is stressed.

SALEUN (p. 550) reports on investigations into the characteristics of two strains of virus maintained without modification for some years in Brazzaville. He quotes two patients whose sera gave positive protection tests though no fever other than dengue had been experienced. Protection was found in three persons vaccinated 3–4 years previously by Laigret's method, but in four recently vaccinated there was no such protection, probably because the vaccine

had deteriorated during transit from Tunis. It is therefore advised that vaccine should be prepared on the spot. Positive tests were found in a number of natives from different areas and in camels, horses, sheep, goats, cattle, one dog and one ostrich. Toxic hepatonephritis resembling that produced by yellow fever was found in the organs of a native who had been given orsanine.

Of 41 pathological specimens examined by BABLET (p. 551) in Paris, 17 were found histologically to show lesions of yellow fever; 15 were from French West Africa, and one from Tchad, which has not hitherto been known to be a yellow fever area. SMITH (p. 551) discusses the distribution of yellow fever in Colombia and the extent of the viscerotomy service in that country. SICÉ and RODALLEC (p. 551) record pathological findings in the organs of two foetuses of pregnant women who died of yellow fever in the French Sudan.

DE LOTTO (p. 552) reports from Abyssinia a febrile disease with icterus, blackish vomit and haemoglobinuria. He states that this is not likely to be yellow fever because it is not epidemic, but in comment it is pointed out that yellow fever often occurs sporadically and that further investigation appears to be desirable in these cases.

ATKEY (p. 552) records the finding of *Aëdes aegypti* and *A. vittatus* in the Sudan and points out the necessity for identification by an entomological expert. O'BRIEN's report (p. 552) deals with the larval index in various districts of the Gold Coast. KENNEDY (p. 553) records experiments which indicate that *Aëdes aegypti* flying against a wind maintains its direction by visual means. It is attracted to moving objects and especially to dark moving objects.

WHITFIELD (p. 554) has written a paper summing up present knowledge on the subject of air transport in relation to the transmission of yellow fever and malaria and on methods of control of insects which may be carried in aircraft. ATKEY (p. 554) gives details of the precautionary measures adopted as regards air travel in the Sudan. At Malakal, where no clinical cases of yellow fever have ever been diagnosed the proportion of positive mouse protection tests given by native sera has risen in the last four years, and the author suggests that the virus may have become attenuated in passing from West to East Africa as a result of local factors. Anti-amaryl aerodromes should be 1 km. away from human habitations and should be free from Aëdes. Medical certificates should be required from passengers and crews coming from infected countries. LE VAN (p. 555) gives an account of the organization of the United States *Aëdes aegypti* motorized control unit in Florida.

Jungle Yellow fever.—ARAGÃO (p. 556) considers that jungle yellow fever must have originated from the adaptation of the urban virus to jungle mosquitoes in comparatively recent times; this entails adaptation to transmission at a lower temperature than is necessary for *Aëdes aegypti*. Those mosquitoes which bite during the day are said to be young which have not yet sucked blood and therefore yellow fever is not transmitted in the daytime, but jungle yellow fever is commonly acquired in the daytime and the author advances the theory that this is only possible when the human skin comes into contact with the virus contained in the faeces of infected mosquitoes, deposited in the woods where the insects shelter. HOFFMANN (p. 556), however, considers the jungle form to be the primal natural state.

Vaccination.—JADIN and ARNALDI (p. 557) found that in Europeans living in the tropics vaccination with Laigret's egg yolk vaccine

produced severe reactions although in the natives it did not. The vaccine was found to be liable to produce meningo-encephalitic reactions and should only be resorted to, under these conditions, in the case of danger such as the outbreak of an epidemic. PELTIER *et al.* (p. 557) describe the very satisfactory results they have obtained with their method of mixed vaccination against yellow fever and variola by the scarification technique. From Nigeria (p. 558) is reported a case of yellow fever in a woman vaccinated four months previously.

PENNA and MOUSSATCHÉ (p. 558) show that in serial passage in fowl embryo a virus of the Asibi strain lost its viscerotropic property and most of its neurotropic property in a relatively short period. PENNA (p. 558) describes a method for the aseptic removal of chick embryo from the egg by means of fine oxy-acetylene flame to open the shell.

C. W.

GOLD COAST. REPORT ON THE MEDICAL DEPARTMENT FOR THE YEAR 1938 [MACKAY (J. M.), Deputy Director of Health Service]. [**Yellow Fever** pp. 17–21.]

During the year 15 cases of yellow fever, all fatal, were recorded; 5 European, 9 African and 1 Syrian. Although this number is small it must be only a small percentage of the total. It is of interest that 4 out of the 5 European patients were foremen employed on road construction and repair work in rural areas where mosquito control is not possible. All presented themselves for treatment at one or other of the centres, but subsequent local investigations in no instance traced any extensive implication of the rural area in which the disease had been acquired.

Aëdes control requires to be extended, for which the present staff is insufficient, but in the colony the larval index has been still further reduced from 0·51 in 1937 to 0·40 in 1938. Work is being continued on the Takoradi and Accra aerodromes, and although they have not yet been declared anti-amaryl, the passenger traffic in the latter is steadily increasing.

Mosquito control is confined to the larger centres and ports and to some of the larger villages along the main trade routes, so with increasing transport facilities the chances of road-borne infection to regions outside the West African endemic area appear to increase yearly. This method of spread is far more difficult to contend with than air-borne traffic, and, although more gradual, may be more sure.

Preventive measures throughout the year comprise careful mosquito control in all the large centres, and paying more attention to trees, as important breeding sites for Aëdes are rot holes in mutilated trees, containing water. Residential areas still provide the most important safeguard for Europeans. During the last year or so the number of Africans living in these areas has increased very considerably as servants are now allowed to keep wives in their quarters.

A number of Europeans have been protected by inoculation against yellow fever, and all should be protected, as most of them have to travel as part of their duties and are liable to be exposed to infection. The quarantine measures during an outbreak of yellow fever profoundly complicate travelling and trade, therefore it is considered that all Europeans, both official and of the trading community, should be protected before sailing for the Gold Coast, and that the protection of officials should be made obligatory. *E. Hindle.*

BRAZZAVILLE : AFRIQUE EQUATORIALE FRANÇAISE. RAPPORT SUR LE FONCTIONNEMENT DE L'INSTITUT PASTEUR DE BRAZZAVILLE PENDANT L'ANNÉE 1938 [SALEUN (G.)]. pp. 51–66.—Fièvre jaune. [**Yellow Fever.**]

A record of investigations on yellow fever, including attempts to isolate local strains, serum protection tests, and the histopathological examination of organs from suspected cases.

The neurotropic Dakar strain has now been maintained in the laboratory for four years without undergoing any modification. In 1937 a local strain of yellow fever virus " S.C." was isolated by the inoculation of the blood of an infected European living at Brazzaville into the brain of a white mouse [see this *Bulletin*, 1938, Vol. 36, p. 32]. This strain has now undergone 45 passages in mice and seems to be identical with the Dakar strain, not only in its general properties but also in its immunological reactions.

Serum protection tests were carried out in 1938 on the blood of 10 Europeans at Port Gentil, and two were positive. One of these had suffered from two attacks of dengue in 1931 and 1937, but no other fever during 9 years' residence in Gabon. The other in 7 years had also only suffered an attack of dengue, but this latter patient came originally from the Antilles and might have been exposed to infection previously. In addition, during 1938, a more or less typical case of yellow fever occurred in a European official living at M'Bigou, and after recovery his serum was strongly positive (12,800 mouse units). The blood of a few vaccinated subjects was also examined. Two vaccinated 4 years previously by Laigret's method of 3 injections protected in dilution of 1 : 6,400, and another patient who received a second injection of egg-coated vaccine 3 years later gave a titre of 12,800. One immunized 3 years previously with only two injections, which produced a very severe reaction, gave a titre of 640 units.

A certain number of Europeans were vaccinated in 1937 by means of egg-coated vaccine sent directly from the Institut Pasteur of Tunis. Three months later the sera of four of these subjects were tested ; two gave absolutely no protection and the other two protected only to a titre of 640 units. These results suggest that the vaccine had deteriorated during transport and show the advisability of preparing it on the spot in the case of any serious outbreak.

Tests carried out in the native population gave 3 out of 12 positive at Fort Rousset (Middle Congo), and 2 out of 15 at Port Gentil (Gabon). On the other hand, in Birao (Oubangui-Chari), in the North-East, adjoining the Anglo-Egyptian Sudan, 8 out of 10 were positive.

The results of tests with various animals in French Equatorial Africa are given in the following table :—

Animals	Positive	Negative	Titre in Mouse Units
5 Camels	3	2	640
6 Horses	3	3	640
6 Sheep or goats	3	3	640
4 Dogs	1	3	640
2 Ostriches	1	1	6,400
13 Cattle	5	8	640
1 Chimpanzee	0	1	—

The organs of 4 Europeans who died during 1938 were examined histologically and two were definitely positive as regards yellow fever. One of these had lived in the province for a year and the other only 3 weeks. Clinical details are given of the course of the disease in each case.

The examination of the organs of 10 natives dying of febrile infections gave no definite evidence of yellow fever, but the liver and kidney of one patient who had been injected with orsanine showed toxic hepato-nephritis resembling that produced by yellow fever. *E. H.*

Bablet (J.). Contrôle histologique de la fièvre jaune dans les colonies françaises au cours de l'année 1939. [**The Histological Control of Yellow Fever in French Colonies during 1939.**]—*Bull. Office Internat. d'Hyg. Publique.* 1940. Mar. Vol. 32. No. 3. pp. 345–347.

Details of the histological examination of 41 specimens of organs sent to the Pasteur Institute, Paris, from patients who had died of febrile diseases accompanied by jaundice and developing rapidly. Yellow fever lesions were found in 17 cases, 15 of which came from French West Africa. It is of interest that Senegal, which headed the list in 1937–38, had no cases of yellow fever, which may be the result of intensive vaccination against the disease.

The other two cases came from French Equatorial Africa, one from Gabon, and the other from Tchad, the latter being the first case of yellow fever noted in this territory.

The specimens from French American Colonies were all negative.

E. H.

Smith (Hugh H.). La investigación y dominio de la fiebre amarilla en Colombia. [**Yellow Fever in Colombia and its Investigation.**]—*Rev. de Hig.* Bogota. 1939. May. Vol. 20. No. 5. pp. 4–19. With 5 figs., 2 maps & 2 graphs.

This is a good general account of yellow fever in Colombia bringing the facts of the work done in that country up to April 1939. The author speaks of the introduction of the viscerotome—the instrument is well depicted—and reproduces a clear and instructive map showing the many " viscerotomy posts " established in Colombia, and a graph showing the number of specimens received at the laboratory month by month since the beginning of 1937. Next is a statement of the distribution of cases of yellow fever in the Republic since 1934, and a map and a graph showing month by month since June 1937 the vaccinations for yellow fever. He concludes with a few remarks on plans for control of the infection, by vaccination and anti-mosquito measures. *H. H. S.*

Sicé (A.) & Rodallec (B.). Manifestations hémorragiques de la fièvre jaune (typhus amaril). Répercussions de l'infection maternelle sur l'organisme foetal. [**Haemorrhagic Manifestations of Yellow Fever. Repercussions on the Maternal Infection on the Foetal Organism.**]—*Bull. Soc. Path. Exot.* 1940. Feb. 14. Vol. 33. No. 2. pp. 66–69.

A description of two cases of yellow fever, both fatal, in pregnant Syrian women in the French Sudan. One of these cases showed marked

haemorrhagic symptoms, which are comparatively uncommon, whilst the other was of the comatose type. Neither of them aborted as a result of the disease, but at the autopsy of each a careful study was made of any changes in the foetus. The majority of the organs showed various alterations more or less corresponding with those in the mother, but the most marked changes occurred in the liver, which showed fatty degeneration, dilatation of the sinusoids, and contained much pigment, but cellular necrobiosis was absent. *E. H.*

DE LOTTO (Enrico). Il quadro nosologico tra gli indigeni dell'estremo ovest etiopico (Beni Sciangul) nei suoi aspetti più caratteristici. [**The Characteristic Diseases of Western Abyssinia.**]—*Policlinico. Sez. Prat.* 1940. Feb. 19. Vol. 47. No. 7. pp. 267–8, 271–4. With 7 figs.

The author writes of a number of diseases found in the region under consideration, mentioning particularly tuberculosis, relapsing fever, syphilis, typhus, yaws and malaria. No new facts about these are given, nor are any figures of the comparative frequency. He draws attention to a condition which he calls bilious haemoglobinuric fever which may be mistaken for yellow fever, and quotes cases with a history of chronic malaria, in which the symptoms were high fever, shivering, abdominal pain, icterus, blackish vomit and haemoglobinuria. Quinine is useless. A diagnosis of yellow fever is not considered likely since the author claims that it usually exists in epidemic form. [But yellow fever, and especially the jungle form, may occur in sporadic fashion. The frequency of Aëdes in this district is not given and there is no record of pathological examination of the liver in these cases, nor of protection tests in the natives such as have been found positive in Malakal, see this *Bulletin*, 1939, Vol. 36, p. 633. Investigation appears to be called for.] *C. W.*

ATKEY (O. F. H.). Distribution et incidence de l'*Aëdes aegypti* au Soudan Anglo-Egyptien en 1938. [**Distribution and Incidence of *Aëdes aegypti* in the Anglo-Egyptian Sudan during 1938.**]—*Bull. Office Internat. d'Hyg. Publique.* 1939. Sept. Vol. 31. No. 9. pp. 1588–1589.

Details are given in tabular form of 5,467,553 examinations during which *Aëdes aegypti* larvae have been found 125 times. It was found essential to have the identification made by an entomologist, for out of 2,817 collections sent by local authorities as *probably* containing *A. aegypti*, only 125 contained this species. In all cases adults were raised from the larvae before being forwarded to the central authorities.

The 125 positive collections included 1,861 specimens of *A. aegypti*. In addition, 421 specimens of *Aëdes vittatus* and two of *A. metallicus*, from Khartoum, have also been identified. *E. H.*

O'BRIEN. Relevé de l'index larvaire annuel dans la Gold Coast pour l'année finissant le 31 décembre 1938. [**A Statement of the Annual Larval Index in the Gold Coast for the Year ending 31st December, 1938.**]—*Bull. Office Internat. d'Hyg. Publique.* 1939. Sept. Vol. 31. No. 9. p. 1590.

The larval index, or percentage of inspected localities in which mosquito larvae were found, of various centres in the Gold Coast is shown in the following table :—

Centres with an Aerodrome.

District	Locality	Larval index	Estimated population
Accra	Accra ...	0·17 p. 100	74,937
Ahanta-Nzima	Takoradi	0·22 ,,	5,478
	Sekondi ...	0·07 ,,	22,356

Important Centres without Aerodrome.

District	Locality	Larval index	Estimated population
Eastern Province	Nsawam ...	0·43 p. 100	10,868
,, ,, ...	Koforidua	0·45 ,,	14,274
Central Province	Cape Coast	0·21 ,,	19,689
Wasaw (Western Province) ...	Tarkwa ...	0·34 ,,	33,792
Kumasi (Ashanti)	Kumasi ...	0·19 ,,	44,627
Eastern Dagomba (Northern Territories)	Tamale ...	0·59 ,,	19,495

E. H.

SENEVET (G.). *Aëdes aegypti* en Algérie. [*Aëdes aegypti* **in Algeria.**]—*Arch. Inst. Pasteur d'Algérie.* 1939. Dec. Vol. 17. No. 4. pp. 598–600. [11 refs.]

KENNEDY (J. S.). **The Visual Responses of Flying Mosquitoes.**—*Proc. Zool. Soc. London.* A. 1940. Vol. 109. Pt. 4. pp. 221–242.

Mosquitoes flying against a wind maintain their direction by visual means.

The author has carried out a series of ingenious experiments in the laboratory in order to analyse the responses of *Aëdes aegypti* to visual stimuli during flight. Three main types of response are recognized. (i) In a horizontal beam of light this insect orientates consistently though not very accurately towards the darkness. (ii) It will orientate accurately towards a vertical black stripe on a white background, and will pursue such a stripe when rotated round it. A moving stripe of this kind is followed, while similarly striped or quite dark walls are abandoned if these are stationary. (iii) If transverse stripes are moved along the floor of a tunnel in which the mosquito is flying freely it will fly in the direction in which the stripes are moving, often going faster than the stripes. If a current of air is passing through the tunnel and the stripes are stationary, the mosquito will fly against the wind, moving forwards over the stripes. But this orientation is completely lost in darkness; it is clearly a visual response—the insect avoids the passage of images over the retina from behind forwards. If the rate of air flow exceeds a certain value (150 cm/sec, 3·3 miles per hour) and the mosquito is unable to maintain its position relative to the ground it immediately alights.

If a mosquito is "activated" by the smell of a host carried down wind and the mosquito flies low this visual orientation will be effective

in guiding it to the host. But this orientating effect of wind will be lost if the insect flies a few metres above the ground. The author suggests that in the case of *Aëdes aegypti* the attraction to moving objects and especially to dark moving objects ((i) and (ii) above) may be more important in the orientation of the insect to its host. On the other hand, the inability of this mosquito to fly except in gentle winds may be an important factor in confining the species to sheltered places.

V. B. Wigglesworth.

WHITFIELD (F. G. Sarel). **Air Transport, Insects and Disease.**—*Bull. Entom. Res.* 1939. Nov. Vol. 30. Pt. 3. pp. 365–442. With 3 maps (1 folding). [Bibliography.]

A useful summary of the subject, which should be consulted in the original by those interested.

The increase of air transport and its potential dangers are discussed with special reference to malaria and yellow fever, and in the case of the latter disease the literature and epidemiology are reviewed. The air communications of the world are shown, and also maps of Africa and South America, showing air routes and yellow fever areas. The work done upon insects found in aircraft is reviewed and the results incorporated together with those from Khartoum. A comparison is made between insects found in the lower " terrestrial " zone of the atmosphere, those found in the upper or " Plankton " zone, and those found in the aircraft.

After a discussion of the economic significance of insects found in aircraft, the control of such insects is considered and suggestions made for future research. *E. H.*

ATKEY (O. F. H.). Sur l'application au Soudan Anglo-Egyptien des dispositions de la convention sanitaire internationale pour la navigation aérienne en vue de la prévention de la fièvre jaune. [**The Application in the Anglo-Egyptian Sudan of the Provisions of the International Sanitary Convention for Aerial Navigation concerning the Prevention of Yellow Fever.**]—*Bull. Office Internat. d'Hyg. Publique.* 1939. Sept. Vol. 31. No. 9. pp. 1585–1587.

Notes on the practical application of these provisions in the Sudan, where there are various regular air services and in certain districts a high percentage of the natives give positive protection tests. However, with the exception of one atypical liver from a case at Wau, no positive liver has yet been found in the Sudan.

If the existence of yellow fever is suspected on clinical grounds the following measures are put into operation :—

(*a*) Passengers are not allowed to embark in any suspected zone unless the airport is anti-amaryl and is not suspect. Under these conditions passengers must remain six days under observation in the aerodrome limits before embarking, and carry a certificate indicating the absence of any risk of contamination.

(*b*) Night stops are forbidden except in anti-amaryl aerodromes, where the passengers and crew must remain on the aerodrome in places proved free from mosquitoes. Traffic is forbidden during the dark.

(*c*) Intensive measures are taken in order to eliminate *Aëdes* from the suspected region.

If the case is not confirmed these restrictions are immediately withdrawn.

Health certificates, such as those issued in Nigeria, are considered essential in the case of passengers coming from infected regions in order to avoid the necessity of keeping them under observation for six days.

With regard to the mouse protection test it is pointed out that at Malakal, where *Aëdes* is practically non-existent, and where no clinical case of yellow fever has ever been diagnosed, the number of natives giving a positive mouse protection test has risen to 18 per cent. in four years. It is suggested that possibly the virus becomes attenuated in Africa in passing from the West to the East as a result of local factors, and may ultimately cease to produce typical symptoms.

Concerning anti-amaryl aerodromes, the author states that they must be situated some distance from human habitations and in the Sudan one kilometre has been considered adequate. A vigorous campaign must be maintained continually against *Aëdes*. El Obeid, where these mosquitoes were abundant, has been made practically free from them in the course of two years ; and in the Sudan generally *Aëdes* has been either eliminated or reduced to negligible numbers at all airports of the international air routes.

The experience in the Sudan shows that by the application of such measures there is no risk of any infected *Aëdes* being carried in aircraft, and the only possibility of the disease being spread is by contaminated persons during the incubation period. This risk could be reduced to negligible proportions if adequate precautionary measures are taken immediately a suspected case is notified, and if the passengers and crew coming from infected countries were provided by the sanitary authorities with medical certificates as to their freedom from infection.

E. H.

Le Van (James H.). **"E-Day" for Yellow Jack.**—*Lehigh Alumni Bull.* 1939. Nov. Vol. 27. No. 1. pp. 8–9 & 23. [Summary taken from *Public Health Engineering Abstr.* Washington. 1940. Feb. Vol. 20. No. 2. p. 11. Signed James H. Le Van.]

There is described the terror that spread when communities learned that yellow fever had struck in those days when neither the cause nor the mode of transmission of this disease was known. In a list prepared by the U.S. Public Health Service, of the 448 outbreaks in the United States in the period from 1668 to 1893, 149 were marked as epidemics.

The article continues by outlining the spread of jungle yellow fever in non-mosquito areas in Brazil and Colombia, and the relation of airplane traffic to the possible spread of yellow fever. There follows the precautions exercised by the Public Health Service at the Miami airport quarantine station and the requirement that northbound planes be disinsecticized at Trinidad, B.W.I., just before taking off.

The organization of the Public Health Service's motorized Aedes Aegypti Control Unit is mentioned and the results of the work of this mobile unit at Key West, Florida, are summarized. A detailed report on Key West is in the Surgeon General's Office listing " the men, equipment, and supplies that will be needed to bring the yellow fever mosquito population there under control quickly should Yellow Jack strike. The city is laid out into districts with the number of men needed as inspectors, the amount of oil larvicide and other supplies necessary, the equipment of the

foremen, inspectors, and laborers, and the entomologist's needs." A similar report is planned for Charleston, S.C., where the unit moved to next.

ARAGÃO (Henrique de Beaurepaire). **Mosquitoes and Yellow Fever Virus.**—*Mem. Inst. Oswaldo Cruz*, 1939. Vol. 34. No. 4. pp. 565–581. [Portuguese version pp. 547–563.]

The author advances the interesting hypothesis that the transmission of jungle yellow fever depends mainly on the human skin coming into contact with the faeces of mosquitoes containing yellow fever virus.

It is generally admitted that in nature both urban yellow fever and the rural fever of North-Eastern Brazil are transmitted exclusively by *Aëdes aegypti*, for repeated observations have shown that the disease does not spread into woods adjoining infected regions.

Jungle yellow fever must have originated in consequence of the adaptation of the urban virus to jungle mosquitoes within comparatively recent times, since the disease could hardly have been overlooked in view of the large numbers of people working there and maintaining intercourse with infected rural zones. Also the absence of yellow fever immunity among the jungle animals and wild animals of Southern Brazil, and the absence of any great mortality among the howler monkeys, furnish additional evidence against the previous existence of jungle yellow fever.

The jungle mosquitoes are adapted to live and also to transmit infection at lower temperatures than *Aëdes aegypti*, for cases of jungle yellow fever have occurred in forests where the temperature conditions exclude transmission by this latter species. *Aëdes aegypti* is stated to require a temperature of more than 25°C. for efficient transmission, whilst to the jungle mosquito 20°C. is sufficient. The development of the virus within the mosquito is found to depend more on the adaptation of the insect host to a given thermal level than to the temperature itself. Thus the same virus finds favourable conditions for development and transmission at 20°C. in jungle mosquitoes, but not till above 25°C. in *Aëdes aegypti*. Similarly in tissue cultures the growth of yellow fever virus depends on the cellular vitality rather than the temperature.

The jungle mosquitoes, and also *Aëdes aegypti* and anophelines, that bite during the day are said to be always young insects which have not yet sucked blood, and therefore neither yellow fever nor malaria transmitted by the bites of these insects are acquired before sunset.

With reference to jungle yellow fever, commonly acquired during the daytime, it is considered that transmission is only possible when the human skin comes in contact with the virus contained in the faeces of infected mosquitoes, deposited on the plants in the woods where the insects shelter. *E. H.*

HOFFMANN (W. H.). La fiebre amarilla selvatica. [**Jungle Yellow Fever.**]—*Rev. Med. Trop. y Parasit.* Habana. 1939. Sept.–Oct. Vol. 5. No. 5. pp. 257–265.

A general statement of the known facts regarding yellow fever in places where *Aëdes aegypti* is not found. The author's own opinion is that this form is yellow fever in its primal natural state in which it maintains and manifests itself in local mammalia. The article sums up the question but contains no new facts. *H. H. S.*

Jadin (J.) & Arnaldi (E.). Considérations au sujet de l'épidémie ictérigène de Zongo et vaccination anti-amarile. [**Considerations on the Zongo Jaundice Epidemic, and Anti-Yellow Fever Vaccination.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. Sept. 30. Vol. 19. No. 3. pp. 377–391. With 9 charts.

The clinical symptoms of the Zongo epidemic [see this *Bulletin*, 1939, Vol. 36, p. 642] so closely resembled those of yellow fever, that in spite of the absence of the characteristic hyaline necrosis in the liver cells, the Belgian authorities decided to take the same precautions as if the epidemic was yellow fever. Accordingly 2,257 individuals were vaccinated by means of Laigret's egg yolk vaccine obtained from Tunis. Out of 29 Europeans, 12 had slight reactions 5 to 6 days later; 14 had violent reactions and were confined to bed with severe headache and pains in the joints, and the temperature of these patients rose to 39°C. Albumen was not present in the urine. Three vaccinated persons showed very serious delayed reactions lasting up to 3 weeks with temperatures as high as 40°C.

With regard to the natives, out of 1,680 vaccinated at Zongo, only three showed serious reactions, and as far as could be determined by an enquiry six weeks later, none of the others noticed any symptoms. At Libenge where 109 vaccinated persons were examined daily, two reacted violently, three moderately and 39 feebly. In children, reactions were more frequent.

The authors conclude that in Europeans living in the tropics this form of yellow fever vaccination is not well supported, and is liable to produce meningo-encephalitic reactions, and should only be resorted to in the case of danger, such as during the outbreak of an epidemic. In natives, however, one can use this vaccination without any grave risk for the protection of the general population. *E. H.*

Peltier (M.), Durieux (C.), Jonchère (H.) & Arquié (E.). Vaccination mixte contre la fièvre jaune et la variole sur des populations indigènes du Sénégal. [**Mixed Vaccination against Yellow Fever and Variola in the Native Population of Senegal.**]—*Bull. Acad. Méd.* 1940. Feb. 20 & 27. 104th Year. 3rd Ser. Vol. 123. Nos. 7 & 8. pp. 137–147.

A record of the results of the application of the authors' method of simultaneous vaccination by scarification against variola and yellow fever [see this *Bulletin*, 1940, Vol. 37, p. 92] to the native population of Senegal.

A total of 98,873 persons was treated in this way and all vaccinations were well supported, even in infants. No serious after effects were ever observed, and especially no case of yellow fever due to the transmission of the vaccine virus by means of *Aëdes aegypti*.

With regard to protection, in the case of variola the mixed vaccination gave the same percentage of successes as when vaccinia alone was used. Concerning yellow fever the result of the examination of 1,630 controlled cases, of whom 1,387 had given a negative protection test before treatment, a month or more after vaccination 95·6 per cent. gave positive protection tests, of which 80·6 per cent. were strongly positive.

This simple method being both innocuous and capable of rapid execution, would seem to offer great possibilities for the protection of the general native population. *E. H.*

NIGERIA: REPORT ON THE MEDICAL SERVICES FOR THE YEAR 1938 [BRIERCLIFFE (R.), Director of Medical Services].—**Yellow Fever** p. 12.

The following is an extract from the Nigeria Report on Medical Services, 1938:—

"*Yellow Fever.* Of the ten cases recorded in 1938, eight were Europeans and two Africans. Both of the latter proved fatal and of the former five died and three recovered. One of these cases, a European lady, who recovered after a severe infection, had been inoculated about four months before the onset. Her blood had not previously been tested for the presence of immune bodies, but it is probable that only slight if any protection had resulted from inoculation; an exceptional occurrence, met with in a small percentage of the one million cases inoculated in Brazil."

PENNA (H. A.) & MOUSSATCHÉ (H.). **Modification of Yellow Fever Virus by Serial Passages in the Developing Chick Embryo.**—*Brasil-Medico.* 1939. Sept. 16. Vol. 53. No. 38. pp. 904–905. [Portuguese version pp. 903–904.]

A record of the passage in fowl embryos of a fully virulent yellow fever virus of the Asibi strain.

The strain was still fully virulent after 19 passages; after 29 passages viscerotropic properties had disappeared, but the strain showed a considerable amount of neurotropism which was greatly reduced in the 39th, 47th and 49th passages.

It is of interest that these modifications took place in the presence of the nervous tissues of the embryos and much quicker than the modification of the 17 D virus which was still fully neurotropic after 89 passages in cultures containing fowl embryos from which the central nervous system had been removed [see THEILER and SMITH, this *Bulletin*, 1937, Vol. 34, p. 690]. *E. H.*

PENNA (H. A.). **New Technique for Aseptic Removal of Chick Embryo from Egg.**—*Amer. Jl. Trop. Med.* 1939. Nov. Vol. 19. No. 6. pp. 589–592. With 3 figs.

The description of a method for sterilizing the egg-shell at the line of opening to allow the removal of the embryos infected with yellow fever virus, etc., without danger of bacterial contamination.

By means of a fine oxy-acetylene flame the egg-shell is burnt through the centre of the air sac, and then the flame run round the shell above the margin of the air sac until the cap can be removed. The shell is a poor conductor of heat and therefore the amount of virus in embryos is unaffected. The great advantage of this technique is the elimination of the necessity for filtering the suspension of embryo in the preparation of vaccine, since there is always a serious loss of virus during filtration.

E. H.

BAUER (J. H.). **Yellow Fever.**—*Public Health Rep.* 1940. Mar. 1. Vol. 55. No. 9. pp. 362–371.

SAWYER (Wilbur A.). **The Last Twelve Years of Yellow Fever Research.**—*Puerto Rico Health Bulletin.* 1939. Feb. Vol. 3. No. 2. pp. 39–44.

Pistone (Ferruccio). Progressi recenti nello studio della febbre gialla e loro importanza pratica. [**Recent Advances in the Study of Yellow Fever.**]—*Riv. di Biol. Colon.* Rome. 1939. Dec. Vol. 2. No. 6. pp. 377–384. English summary (3 lines).

Health. Canberra. 1939. Oct. Vol. 17. No. 10. pp. 109–116.—**Australia and Yellow Fever.**

THE TYPHUS GROUP OF FEVERS.

Précis of Abstracts in this Section.

General.—The serological reactions of the various forms of typhus have been set out in tabular form by de Magalhães (p. 562).

Davis (p. 562) finds that *Rickettsia diaporica* found in ticks in Wyoming are identical with those from Montana. Cox and Bell (p. 562) have prepared practically pure cultures of *R. diaporica* suitable for agglutination tests. Burnet and Freeman (p. 563) have confirmed the findings of Dyer that *R. burneti* of Australian Q fever is identical with the Rickettsia recovered from ticks in Montana except that the latter is rather more virulent. *R. burneti* does not provoke agglutinins for strains of *Proteus X*.

Malbrant (p. 563) reports a disease of dogs in the Congo apparently caused by Rickettsia resembling *R. canis* except that they are pathogenic for guineapigs. Mesnard and Toumanoff (p. 564) have found Rickettsia pathogenic for guineapigs in ticks collected from a deer in Cochin-China.

Louse-borne.—Kuczynski-Godard (p. 564) describes "micro-epidemics" of typhus in the Peruvian highlands. In silent areas Rickettsia-infected lice have been found on children, though no cases of typhus have been seen, but there is no evidence of Rickettsia other than those of typhus. It is thought that non-immune people coming into contact with apparently healthy carriers of infected lice give origin to the micro-epidemics. Barlovatz (p. 565) describes louse-borne typhus in the forest region of the Congo, giving clinical details; *Proteus OX19* and *OXK* are agglutinated in high titre. Children are seldom ill and mild cases may be mistaken for influenza, dengue or paratyphoid; many of the natives appear to be immune. In the wards bed-to-bed infection is rare, but most of the imported ward personnel were attacked.

d'Ignazio *et al.* (p. 565) describe polyneuritis, with permanent damage, as a sequela of typhus in Abyssinia.

Danielopolu and Craciun (p. 566) show that in severe cases of typhus there is an increase in the number of red blood cells, and a leucocytosis due to an increase in the mononuclear cells. Typhus nodules are caused by desquamation and multiplication, due to the toxin of endothelial cells lining capillaries. Plasmocytes are seen in blood films and their presence is a point in differentiation from typhoid. Danielopolu *et al.* (p. 567) again describe their findings. They consider that the nervous symptoms of typhus are not due to toxic action on the nervous system but to lesions in the capillaries of that system. The cerebrospinal fluid becomes yellow owing to the presence

in it of altered blood pigments. They discuss the differential diagnosis from typhoid and relapsing fever, and the methods of prophylaxis, including vaccination, which should be employed.

RAYNAL (p. 569) restates his opinion that in Shanghai sporadic typhus is due to a murine virus transmitted, not in the usual way by fleas, but by lice.

HILGERMANN (p. 569) suggests a further trial of the method of treating cases of typhus by means of vaccine of *Proteus X19*. LAIGRET and DURAND (p. 569) use white mice and a stabilized virus in tests of the neutralizing power of immune sera. In the *Archives de l'Institut Pasteur d'Algérie* (p. 569) it is suggested that persons bitten by lice in the course of duties in connexion with outbreaks of typhus should be given immediate intravenous injections of 10 cc. immune serum, which is now available.

DE LA RIVIÈRE (p. 570) gives a clear account of preventive measures to be taken in connexion with louse-borne typhus. General measures consist of supervision of populations, their movements and their standards of personal cleanliness. The layout of special typhus hospitals is discussed, together with methods of delousing by disinfection and by close cutting of scalp and body hair. Louse-proof clothing for workers is referred to and mention is made of prophylactic vaccination. NICOLESCO (p. 571) discusses the protection of medical workers by means of louse-proof clothing and vaccination. MÜHLENS (p. 571) writes of preventive measures taken during the war of 1914–1918.

Flea-borne.—DYER (p. 571) suggests, as reasons for the spread of endemic typhus from the towns to the rural districts of eastern U.S.A., the mass rat migrations due to increased cultivation of food crops in place of cotton, and the fact that field mice have been found to be naturally infected.

BLANC and BALTAZARD (p. 572) show that there is no loss of virulence in murine virus preserved in the faeces of fleas, so long as it is dry, over a period of 651 days. This may explain much that is obscure in the carry-over of infection from season to season and country to country.

LILLIE *et al.* (p. 572) show that focal typhus nodes are produced in the brain of smaller rodents such as mice and rats by the virus of endemic typhus, but less constantly by that of Rocky Mountain fever. DURAND and SPARROW (p. 572) show that white mice inoculated intranasally with murine or boutonneuse virus show enormous numbers of Rickettsia in the lungs. MACCHIAVELLO (p. 573) describes the blood changes in white rats inoculated with murine typhus. Leucocytosis gives way to later moderate leucopenia with relative lymphocytosis and monocytosis.

BLANC and BALTAZARD (p. 573) lay down criteria required for the proof that a typhus virus is adapted to a particular insect host. They have found that the virus of epidemic typhus can satisfy these requirements in the flea *Xenopsylla cheopis* [and presumably therefore may be transmitted by this flea].

LORANDO and CARAMAOUNA (p. 574) report a case of phlebitis in murine typhus. PFEIFFER (p. 574) reports two cases of typhus in S. Africa which he regards as probably louse- and flea-borne respectively.

Tick-borne.—TRAVASSOS and DIAS (p. 574) have established the identity of the viruses of the spotted fever of Minas Geraes, São Paulo

and the Rocky Mountains. Welch and Jakmauh (p. 575) describe a case of Rocky Mountain fever.

Topping (p. 575) records a slight amount of success in the treatment of experimental Rocky Mountain fever with immune serum.

Nobécourt and Martin-Lipmann (p. 575) report a case of typhus resembling boutonneuse fever from the middle of France.

Le Gac (p. 575) records a case of apparently tick-borne typhus in Oubangui; the patient's serum showed complete neutralizing power against Rocky Mountain virus and partial against boutonneuse virus.

Mite-borne.—Lewthwaite and Savoor (p. 576) point out that tsutsugamushi, rural typhus and scrub typhus are identical in all respects, and that the supposed absence of primary sore in rural and scrub typhus is not enough to distinguish them, since the primary sore may be so slight as to be missed or to have disappeared at the time of examination. They therefore state that the name tsutsugamushi should be applied to all such fevers, the names rural and scrub typhus being abandoned. Kotter (p. 577) however, in describing the typhus found in N. Sumatra states that the only difference between this and scrub typhus is the presence of a typical primary punched-out ulcer in the former. The disease appears to be particularly prevalent in a certain area.

Webster (p. 577) reports further work on the *Proteus X19* and *XK* types of typhus in the Simla hills. The virus of the former has been isolated from rats and of the latter from man. Larval *Trombicula delhiensis* found on monkeys have not been proved to be infective, nor have the monkeys tested been found positive to *Proteus OXK*.

Reynes and Richard (p. 578) describe a case of typhus of the *Proteus OXK* type with marked nervous symptoms. Rivoalen *et al.* (p. 578) describe a case of typhus of the *Proteus OXK* type.

Vaccination.—Mariani (p. 578) points out that the non-pathogenic *Rickettsia rocha-limae* is found in a large proportion of lice in Abyssinia. It occurs in the louse faeces and may give rise to error in the preparation of vaccine by Weigl's method, and it is possible that the theory of a rickettsial origin of trachoma may have arisen through overlooking this fact.

Durand and Giroud (p. 579) employ a vaccine prepared from emulsions of the lungs of guineapigs and rabbits infected by the nasal route with the virus of epidemic typhus, suspended in 2 per cent. formol saline, centrifuged repeatedly and suspended in serum. Immunity conferred in animals depends more on the number of injections than on the size of the dose.

Zia *et al.* (p. 579) cultivate Rickettsia of epidemic typhus in sterile mouse embryo tissue in human serum Tyrode solution on agar. The growths are killed by Merthiolate and carbolic and the vaccine thus prepared is non-infective but can produce a positive Weil-Felix reaction.

Tchang and Mathews (p. 579) show that inoculation of infected guineapig brain into the yolk sac of developing chick embryo gave better results than inoculation into the embryo itself. Zinsser *et al.* (p. 580) show that profuse growths of Rickettsia may be obtained by infecting minced chick tissue from egg yolk cultures, and spreading the tissue over agar surfaces. Cox and Bell (p. 580) report on the protection afforded to guineapigs after inoculation with the virus of epidemic and endemic typhus prepared from infected chick embryo.

Blanc and Baltazard (p. 580) show that vaccination with a living murine vaccine attenuated by treatment with bile, in a single dose, produces solid and lasting immunity against murine and epidemic typhus. Flea excreta are dried and in this state the virus persists for at least two years ; treatment with bile, though attenuating the virus, does not alter its infectivity.

Finlayson and Grobler (p. 581) find that guineapigs inoculated with killed Mexican murine virus are protected against the S. African epidemic strain. They also (p. 581) show that the viruses of S. African endemic and epidemic typhus are immunologically identical, but that they produce only inapparent infections in rats and mice. *C. W.*

de Magalhães (Octavio). Typho exanthematico em Minas Geraes. Reacções sorologicas. [**Typhus in Minas Geraes. Serological Reactions.**]—*Brasil-Medico.* 1939. Mar. 4. Vol. 53. No. 10. pp. 325–329. With 1 chart.

The chief value of this paper rests in a table of serological reactions with *Proteus* X_2, X_{19}, and *XK* in the various forms of typhus-like diseases, not only in Minas Geraes but also in Europe, the Rocky Mountain type, the Mexican, Australian, Malayan, Japanese and American. A similar table is now to be found in the text-books dealing with tropical medicine. *H. H. S.*

Davis (Gordon E.). *Rickettsia diaporica* : **Recovery of Three Strains from *Dermacentor andersoni* collected in Southeastern Wyoming : their Identity with Montana Strain 1.**—*Public Health Rep.* 1939. Dec. 15. Vol. 54. No. 50. pp. 2219–2227. With 4 figs.

Batches of ticks (*D. andersoni*) were collected in South-Eastern Wyoming and injected into guineapigs. Three strains of a filter-passing rickettsia-like organism were isolated from these ticks. The morphology and staining characteristics of these organisms, the reaction in guineapigs, experimental transmission by *D. andersoni* and cross immunity tests with the original Montana strain of *Rickettsia diaporica* all indicate that the three Wyoming strains and the Montana strain are identical [see this *Bulletin*, 1940, Vol. 37, p. 254.]

D. Harvey.

Cox (Herald R.) & Bell (E. John). **The Cultivation of *Rickettsia diaporica* in Tissue Culture and in the Tissues of Developing Chick Embryos.**—*Public Health Rep.* 1939. Dec. 8. Vol. 54. No. 49. pp. 2171–2178.

The results of these experiments show that *R. diaporica* grows more readily in the yolk sac than in other tissues of the developing chick embryo or even in Maitland cultures. Similar results were obtained previously with the Rickettsia of Rocky Mountain fever and of typhus fever but there was not so abundant growth of Rickettsia as in the present series of experiments ; the nearest approach to the same abundance of culture was with the Rickettsia of Q fever of Australia. The authors have also found recently in the tissues and faeces of adult and nymphal *D. andersoni* ticks as great numbers of Rickettsia as in the yolk sac cultures ; with these materials it has been possible to prepare practically pure cultures of *R. diaporica* suitable for agglutination tests. *D. H.*

BURNET (F. M.) & FREEMAN (Mavis). **A Comparative Study of Rickettsial Strains from an Infection of Ticks in Montana (United States of America) and from "Q" Fever.**—*Med. Jl. Australia.* 1939. Dec. 16. 26th Year. Vol. 2. No. 25. pp. 887–891. With 3 figs. [Summary appears also in *Bulletin of Hygiene.*]

In previous papers Burnet and his colleagues described a new type of fever occurring in Queensland to which the provisional name of "Q" fever was given. Investigation showed that it was caused by a rickettsial type of organism (*Rickettsia burneti*), which did not provoke agglutinins for *Proteus X* strains, which appeared to have its natural reservoir in a Queensland bandicoot (*Isoodon torosus* Ramsay), and which appeared to be carried from one animal to another by the tick *Haemaphysalis humerosa*. A year or two previously (1935), a rickettsial organism was isolated from a batch of ticks in Montana. Study of this organism showed that it produced a febrile disease in guineapigs, and was capable of giving rise to human infection in the laboratory. DYER in the United States observed complete cross-immunity between the "Q" and the Montana strains in guineapigs, and found that the "Q" strain was agglutinated by the serum of the laboratory worker who had been infected with the Montana strain. The present authors have now compared in Australia the behaviour of the Montana and the "Q" strains. Both organisms were agglutinated to about the same titre by sera coming from a number of animals experimentally infected with one or other strain. Pathogenicity experiments showed that both organisms were infective to guineapigs, mice and monkeys, but that the Montana strain was undoubtedly the more virulent of the two. In guineapigs, for example, inoculated intraperitoneally the Montana strain gave rise to acute enlargement of the spleen with fibrinous exudate over the anterior pole, while exudate was never seen in guineapigs infected with the "Q" strain. This greater virulence was also revealed in cultivation experiments on the chorio-allantois of the developing chick. The "Q" strain produced no lesions and survived for only a few passages, while the Montana strain gave rise to a confluent mass of specific foci indistinguishable macroscopically from those caused by the psittacosis virus. Moreover, infection was readily carried on by passage. There seems no question, however, of the essential similarity of the two strains, and it is concluded that the Montana strain should be regarded as belonging to the same species as *Rickettsia burneti*. [See also this *Bulletin*, 1938, Vol. 35, pp. 62–64, 835; 1939, Vol. 36, p. 479.] *G. S. Wilson.*

MALBRANT (R.). Rickettsiose canine au Congo français. (Note préliminaire.) [**A Rickettsial Disease of Dogs in the French Congo.**] —*Bull. Soc. Path. Exot.* 1939. Dec. 13. Vol. 32. No. 10. pp. 908–913.

A severe and often fatal disease of dogs in the Congo is described; two types are noted, the nervous and the typhus type. Rickettsia resembling *R. canis* of DONATIEN (N. Africa) were seen in films made from the blood and tissues of such animals; it was also possible to infect guineapigs which developed fever with loss of weight and orchitis. It is also stated that the virus in the blood of the guineapigs was filterable. *R. canis* (Donatien) is not pathogenic for guineapigs.

D. H.

MESNARD (Joseph) & TOUMANOFF (Constantin). Agent infectieux du genre Rickettsia, mis en évidence chez une tique (*Haemaphysalis bispinosa* Neumann) du cerf de la Cochinchine. [**Isolation of a Rickettsia Infective for Guineapigs from a Tick** (*Haemaphysalis bispinosa* **Neumann**) **collected from a Sambur Deer in Cochin-China.**] —*C. R. Acad. Sci.* 1940. Mar. 4. Vol. 210. No. 10. pp. 378–380.

Several ticks, *H. bispinosa*, were collected from a deer killed in the forest land in Cochin-China. These were crushed and emsulsified and injected into several guineapigs. One of these, a female, reacted with fever and marked congestion of the vulva. This animal was killed and emulsion of the brain used to inoculate other animals, the virus has now been passaged 25 times with fever and orchitis in male animals. Typical Rickettsia were seen in films made from the tunica. *D. H.*

STRONG (Richard P.). **The Charles Franklin Craig Lecture for 1938. Progress in the Study of Infections due to Bartonella and Rickettsia, with Special Reference to the Work performed at Harvard University.**—*Amer. Jl. Trop. Med.* 1940. Jan. Vol. 20. No. 1. pp. 13–46.

CARPANO (Matteo). Sul ciclo evolutivo delle Rickettsie. [**The Evolution of Rickettsia.**]—*Riv. di Parassit.* Rome. 1939. Dec. Vol. 3. No. 4. pp. 293–303. With 12 figs. on 1 plate. English summary (5 lines).

" The author refers to his previous publication, about three years ago, concerning the *general morphology, seat of development* and *manner of reproduction* of *Rickettsia*; in particular to his studies on birds. He summarizes and illustrates in detail the *general evolving cycle* of such *Protista* which he had already clearly defined in his first publication."

TOPPING (Norman H.). **The Preservation of the Infectious Agents of Some of the Rickettsioses.**—*Public Health Rep.* 1940. Mar. 29. Vol. 55. No. 13. pp. 545–547.

This paper is reviewed in *Bulletin of Hygiene*, 1940, Vol. 15, p. 525.

KUCZYNSKI-GODARD (Maxime H.). Una inspección preliminar de las zonas del tifus andino. [**Preliminary Inspection of the Typhus Areas of the Andes.**]—Reprinted from *Reforma Méd.* Lima. 1940. 15 pp. English summary.

" Discussing the ecological conditions in the Peruvian Highlands (9 to 13,000 feet) in relation to typhus fever a preliminary account is given of an investigation concerning lice, especially collected from apparently healthy native children. Distinctions are made between silent areas and ' micro-epidemic outbreaks.' These seem to be intimately correlated with special locally prevailing conditions. In silent areas rickettsia-infected lice have been met with although no cases of typhus could be noticed in the Indian population. There is no evidence of other rickettsiae besides those connected with typhus-fever. Following the death of a Swiss workman the same phenomenon—rickettsia-infected lice carried by Indians without apparent diseases—was realized 18 days later. Children's infections are suspected to play an important part in the strange epidemiological picture. Non-immunized people coming into touch with the apparently healthy carriers of infected lice give origin to ' micro-epidemic

outbreaks.' The paper is intended to prepare a more detailed investigation of this hygienically important situation rebuking unproved theoretical assumptions."

BARLOVATZ (A.). Typhus exanthématique de forêt au Congo. [**Typhus in the Forest Region of the Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1940. Mar. 31. Vol. 20. No. 1. pp. 23–40. With 1 fig. & 5 charts. [15 refs.]

The author's summary is as follows :—

" About 200 cases of spotted typhus are described, for the first time in Belgian Congo, as occurring in the tropical rain forest bordering the Congo river. The symptoms are set forth in detail, and conform to classical standards, peculiar features being a slow pulse rate, slight or no involvement of the brain, and no mortality in the series composed mainly of young Negro adults in good physical condition. The main signs were enlargement of the spleen, albuminosis of cerebro-spinal fluid, slow pulse, cylinders, red and white blood corpuscles, and albumen in the urine, fever reaching at least once, usually the very first days, a high level, and bronchitis. Several cases masqueraded as acute nephritis of unknown origin, until Weil-Felix reaction was found positive. The highest titre obtained was 1/12800 with Proteus OX19, OXK was agglutinated in somewhat lower concentrations than OX19, OX2 being usually negative. In a number of instances Weil-Felix reaction was negative the first days of fever, rose then steeply, and subsided then slowly in about 3 months. It may be positive the second day of fever. Usually the highest titre is reached a few days after the fever has disappeared. Children are seldom ill, infants practically immune. Europeans may suffer. Many light cases resemble influenza until closely examined. Immunity seemed to be quite frequent among Negroes from the endemic area, but all the imported personnel of the typhus wards went sooner or later down with typhus. This contrasts with the rarity of bed-to-bed infections which were quite exceptional, though many miscellaneous patients were imported too. The disease is transmitted by body lice. Incubation was in one instance 8 days, in another one over 3 months. It is suggested, that mild spotted typhus may be endemic in many places of tropical Africa, camouflaging as ' flu,' ' red fever,' ' dengue,' ' paratyphoid ' and so on and should be looked for closely."

GAUD (M.) & POCOULE (A.). Quelques acquisitions récentes sur le typhus exanthématique. [**Recent Advances in Typhus.**]—*Bruxelles-Méd.* 1940. Apr. 14. Vol. 20. No. 24. pp. 717–723.

This is a review of recent advances in knowledge of typhus fevers with special reference to the big epidemic in Morocco in 1937–38.

D. H.

D'IGNAZIO (Camillo), LOMBARDI (Alfredo) & D'ARCANGELO (Domenico). La polineurite nel tifo esantematico. [**Polyneuritis in Exanthematic Typhus.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1939. Nov. Vol. 20. No. 11. pp. 699–716. With 7 figs.

The authors give details of six patients in Abyssinia who developed polyneuritis after the defervescence of fever in typhus. All were Europeans. Symptoms commenced from 4 to 30 days after the end of the febrile period, increased slowly in severity and lasted one month or

longer. Cure was complete in one only, but the outcome was fairly satisfactory in the remainder. The condition was apyrexial. Only the nerves of the extremities were affected and those of the arms were more severely attacked than those of the legs. Wasting of the muscles of the hands, hyperaesthesia or even hypoaesthesia with tenderness of the ulnar nerve (which was most commonly affected) were noted; the heat regulating mechanism was disturbed in three; there was paresis and failure of extension of the fourth and fifth fingers; the electrical reactions included the reaction of degeneration; there was hyperkeratosis and desquamation; the tendon reflexes were normal.

Treatment was experimental only, vitamin B_1, liver extract and iodine preparations were given and the muscles treated with faradism.

C. W.

DANIELOPOLU (D.) & CRACIUN (E.). Nouvelles recherches sur le sang dans le typhus exanthématique. Etude de l'hémogramme en fonction des lésions vasculo-conjonctives de tous les organes. [**New Researches on the Blood in Typhus. Study of the Blood Picture with Reference to the Typhus Lesions in the Organs.**]—*Bull. Acad. Méd. Roumanie.* 1939. 4th Year. Vol. 8. No. 5–6. pp. 457–476. With 4 coloured figs. on 2 plates. [71 refs.]

The earlier work of one of the writers (D. Danielopolu) during the big epidemic of typhus in Rumania in 1918 is referred to; a very large number of cases was then observed and numerous blood counts were made; slides from these patients have now been re-examined and some new cases followed up. The findings are as follows:—

As regards the red cells little change was noted in the mild and medium cases but there was a considerable increase in the number of red cells in hypertoxic cases with collapse.

As regards the white cells there is occasionally a leucopenia in mild cases but usually a slight leucocytosis of 10,000 to 16,000; to observe this leucocytosis it is necessary to examine the blood from day to day as the increase in white cells may not be observed until the second week of fever. In cases of medium severity the count of white cells increases up to 20,000 per cmm.; and in the hypertoxic cases still higher counts obtain. The authors insist that the leucocytosis is in uncomplicated cases of typhus due to an absolute increase of the mononuclear cells; only in 5 per cent. of cases was there an increase in polynuclears without any increase in mononuclears. Also this mononucleosis is more frequent and more intense as the severity of the cases increases. The more severe the case the greater the leucocytosis.

As regards the typhus nodules in the smaller blood vessels in various organs these are due to a desquamation followed by multiplication of the endothelial cells lining the capillaries, this reaction is due directly to the effects of the typhus toxin which acts on endothelial tissues; in addition to the endothelial cells other cells are found in the lesions such as histiocytes, macrophages and tissue cells, these may be carried to the site of the lesion by the blood stream and may also be found in films made from the peripheral blood and thus the nature of the blood picture in typhus may be affected. Plasmocytes with deep basophilic cytoplasm and monocytes are also seen in blood films and the presence of the former is a diagnostic point in favour of typhus as against typhoid.

D. H.

Danielopolu (M.), Lupu (M.), Craciun (E.) & Petresco (M.). Sur certains caractères épidémiologiques et anatomo-cliniques du typhus exanthématique. Typhus endémique et typhus épidémique de guerre. Problème de la vaccination. [**Epidemiological and Clinical Characters of Typhus observed in the War of 1914–1918. The Problem of Vaccination.**]—*Bull. Acad. Méd.* 1940. Jan. 23 & 30. 104th Year. 3rd Ser. Vol. 123. Nos. 3 & 4. pp. 56–69. With 4 figs.

——, ——, —— & ——. Sur les caractères principaux du typhus exanthématique de guerre et sur les associations de typhus et de typhoide, ainsi que de typhus et de fièvre récurrente. Nécessité de la vaccination antiexanthématique dans les circonstances actuelles.—*Bull. Office Internat. d'Hyg. Publique.* 1940. Mar. Vol. 32. No. 3. pp. 300–341. With 21 figs. (15 on 8 plates). [22 refs.]

These two papers contain much the same information and conclusions and are therefore abstracted together. The authors consider that to realize what typhus really is it is necessary to have seen and studied many cases during one of the great epidemics such as occurred during and after the war 1914–18 in Russia, Rumania, Serbia and Poland; it is possible that such opportunities may again arise in the near future. In addition to the study of typhus itself opportunity also arises to study mixed infections with relapsing fever and typhoid fever. Certain interesting epidemiological observations made in Rumania in 1917 in this connexion are referred to. In the winter when lice infestation was at its highest and people were crowded into insanitary houses epidemics of relapsing fever and typhus ran together and were equally prevalent, the number of cases of each disease was about the same; yet the medical men and attendants on these people although they kept themselves free from lice contracted typhus but not relapsing fever. Several of these medical men stated that they were aware of being bitten by a single louse and developing typhus 8 days later. In the summer when infestation became much less in all people the epidemic of relapsing fever ceased but typhus cases continued to occur although much fewer in numbers.

The explanation of these facts as given by the authors is as follows:— In relapsing fever infection occurs by crushing of the lice thus setting free the virus which passes through pre-existing lesions in the skin caused by scratching; for this to succeed heavy louse infestation is necessary, whereas in typhus the virus is found in the excreta of the louse and can be carried through the lesion made in the skin by the bite of the louse, pre-existing lesions are not necessary, and cases have occurred where people have been infected by the bite of a single louse; this does not occur in relapsing fever.

During the epidemic in Rumania in 1917–18 the senior author (Danielopolu) observed over 400 cases of typhus and examined them from day to day; as regards the clinical picture he considers that in epidemics where the virus is rapidly and repeatedly passed from louse to man and man to louse the virus becomes as it were a fixed virus and the incubation period in all cases is 8 days and the fever lasts 15 days. There are three types of case; the mild, the severe and the hypertoxic, these last are typical and numerous and are rarely met with in sporadic cases at other times. A certain number of cases of

abortive fever (lasting less than 15 days) and inapparent cases also occur. Careful examinations were made of the blood of many patients and the results of these examinations are as follows :—The red cells were as a rule normal in number, but in certain hypertoxic cases the blood is concentrated and the count may rise to 7 million or more per cmm. As regards the white cells there was a definite leucocytosis, which was due in 95 per cent. of cases to an increase in the mononuclear cells ; this leucocytosis was slight in the mild cases, more marked in the severe and hypertoxic cases. In these last if the count was over 20,000 and continued to increase after defervescence then the prognosis was bad and a fatal issue probable [a graph is included in the paper of a case in which, in the apyrexial period, the leucocytes numbered 72,000 shortly before death], especially is this so if accompanied by cyanosis of the lower limbs and collapse with low blood pressure. The action of typhus toxin falls directly on the endothelial lining of the smaller blood vessels and capillaries of the organs of the body, hence the typhus " nodules " and the presence in the blood picture of cells of endothelial origin and of plasma cells—a condition not met with in typhoid or relapsing fever.

In the opinion of the author the nervous symptoms met with in typhus, delirium typhoid state, etc., are not due to direct action by the toxins on the nerve tissues but are due to the lesions formed in the capillaries of the nervous system by the action of the toxin. Also in typhus marked changes can be noted in the cerebrospinal fluid and these changes can be attributed to the same cause. In severe cases the fluid is tinged yellow and in hypertoxic cases may be the colour of urine and may coagulate when withdrawn ; this yellow colour is due to altered blood pigments derived from destroyed red blood cells in the vessels in the brain. There is also an increase in the albumin content of the fluid and a marked cellular reaction ; this was slight in mild cases, a few lymphocytes only, but in severe and hypertoxic cases many cells are present in the fluid, the majority of these are polynuclears but plasmocytes and endothelial cells are also present ; the condition is again of grave significance. As regards mixed infections of typhus and typhoid and relapsing fever the differential diagnosis is as follows :—The discovery of the parasite in the peripheral blood clinches the diagnosis so far as relapsing fever is concerned, but the patient may also have a typhus infection, the same applies to typhoid where the blood culture is positive yet typhus infection may also be present. The Weil-Felix reaction may help but may be delayed or not definite.

The diagnostic points to look for then as regards typhus are :—Injection of conjunctivae and vasodilatation of face, leucocytosis over 20,000, presence of numerous plasmocytes and monocytes in the peripheral blood ; this is not met with in typhoid or relapsing fever. The rash, the condition of the cerebrospinal fluid, yellow colour, increase of cells, coagulation, again not met with in the other two diseases.

As regards prophylaxis—delousing and bathing and clothing stations must be established ; special louse-proof clothing for attendants provided. Vaccination is by means of a living attenuated murine virus ; it should be noted that in Europeans this may give rise to severe reactions and infections.

D. H.

Raynal (J.). Le typhus murin à Chang-Hai. [**Murine Typhus in Shanghai.**]—*Bull. Soc. Path. Exot.* 1940. Mar. 13. Vol. 33. No. 3. pp. 168–175.

This paper contains similar views to those expressed in previous papers by the same author, and repeats that sporadic typhus in Shanghai is due to a murine virus but that the epidemic of 1938 was also caused by the same virus carried from man to man by lice.

An interesting finding arose from examination of rats from which a strain of virus was isolated, in that no Xenopsylla fleas could be found on any of these rats. The fleas present were *Ctenocephalus musculi* and it was not found possible to isolate a virus from these fleas [see also this *Bulletin*, 1940, Vol. 37, p. 256]. *D. H.*

Hilgermann (R.). Behandlung und Schutzimpfung bei Fleckfieber mittels Proteus X 19-Vakzine. [**Treatment of Typhus with Vaccine of *Proteus X19*.**]—*Deut. Med. Woch.* 1939. Dec. 8. Vol. 65. No. 49. p. 1774.

This note is republished in view of the possibility of a recurrence of typhus fevers owing to the outbreak of war. The author refers to a note published in 1917 [Hilgermann & Arnoldi, this *Bulletin*, 1918, Vol. 12, p. 99] in which is described a case of typhus fever successfully treated by means of vaccine of *Proteus X19*, he suggests that if cases are again met with the opportunity should be taken to give a further trial to this method. *D. H.*

Laigret (Jean) & Durand (Roger). Sur une épreuve sérologique décelant les propriétés neutralisantes des sérums à l'égard du virus du typhus. [**The Neutralizing Power of Sera against Typhus Virus.**]—*C. R. Acad. Sci.* 1940. Jan. 3. Vol. 210. No. 1. pp. 67–68.

Hitherto experiments for the demonstration of the neutralizing power of the sera of convalescents from typhus fever were carried out with guineapigs, rats or monkeys. These animals require large doses of virus to produce apparent infections. The authors find, however, that by employing white mice and a virus which has been stabilized by passage in these animals only a minute dose is required to produce infection and the neutralizing power of the sera can be easily and accurately demonstrated. *D. H.*

Archives de l'Institut Pasteur d'Algérie. 1939. Dec. Vol. 17. No. 4. p. 650.—La prévention du typhus exanthématique par le sérum de convalescents. [**The Prevention of Typhus by the Serum of Convalescents.**]

This is a pamphlet sent out by the Pasteur Institute of Algiers for the information of medical men and others engaged in dealing with outbreaks of typhus. It is suggested that if any such people are bitten by lice in the course of their duties they should at once be given an intravenous dose of 10 cc. of immune serum. The notice adds that serum is available at the Institute and would be despatched at once on receipt of telegram or telephone message. The immunity is immediate and lasts from 2 to 3 weeks [see also Topping below p. 575]. *D. H.*

De la Rivière (R. Dujarric). Prophylaxie du typhus exanthématique. [**Prophylaxis of Typhus.**]—*Mouvement Sanitaire.* 1939. Dec. Vol. 16. No. 187. pp. 537–549. With 2 figs. [Summary appears also in *Bulletin of Hygiene.*]

Successful prophylaxis of typhus depends on accurate, early diagnosis and a logical application of knowledge of the mode of spread. The differential diagnosis is briefly discussed under the clinical and laboratory aspects. Human blood is infectious to lice from the fifth day to the crisis and the louse becomes infectious eight days after ingesting infected blood. The basis of prophylaxis is the destruction of lice on typhus patients, suspects and contacts. General hygienic measures consist in supervision of national and international movements of population, and the housing of the poorer classes, and such general measures against parasitism as promotion of personal hygiene, frequent baths and changes of underclothing. Adequate diet and avoidance of fatigue and overcrowding are important also. Special hospitals for isolation of typhus patients should have the following components: (1) a building near the entrance for delousing all admissions, to contain closed receptables for infected clothing, clean clothes and underclothing, and an installation of baths and douches; (2) a medical examination room. Both (1) and (2) should be washed down daily with 5 per cent. sodium carbonate solution and fumigated occasionally by sulphur. (3) Observation cubicle ward for suspect cases; (4) Wards for typhus cases and for negative cases; (5) Discharge block where recovered cases bathe and receive their disinfected clothing; (6) Disinfecting plant for dealing with ambulances, stretchers, bedding and clothing. Alternative methods of disinfection are boiling in 5 per cent. sodium carbonate solution, high pressure steam, current steam and sulphur fumigation. In default of these, garments should be ironed, giving special attention to folds and seams.

Delousing involves a close cut of the scalp, axillary and pubic hairs, the cut hairs being collected in paper and the whole burnt afterwards. The scalp is treated with a benzene compress, the pubis with grey ointment and the eyelashes and eyebrows with yellow precipitate ointment. Hatching of ova should be watched for seven days later. The nursing and delousing staff should be chosen, if possible, from those who have already had typhus and the whole staff should be isolated. Everyone working in the wards should wear a louse-proof costume consisting of trousers *en sac* closed below the feet, sleeved blouse well fastened at the neck and wrists, a cap to cover the scalp, ears and back of neck, and rubber gloves. A bath and change of underclothing are required daily.

Other measures comprise delousing of all inmates of the patient's house, disinfection of their clothing and bedding, and sulphur fumigation of the premises. This should be extended to all contacts of the patients during the two days before the onset of symptoms. Children are in addition kept from school for 20 days. Sanitary authorities should supervise cheap clothing stores and homes for vagrants, carrying out delousing and disinfection as required. Similar supervision and action should be undertaken at frontiers and ports.

The prophylactic value of typhus convalescent serum has been shown by Nicolle *et al.* and the vaccines of Weigl and of Blanc have given good results (references given). Supplies of these should be obtained.

The relevant decrees of 8th July, 1920, and 8th October, 1927, are quoted together with the International Sanitary Convention for Air Navigation of 12th April, 1933, in so far as it deals with typhus.

J. W. Healy.

Nicolesco (P.). La prophylaxie du typhus exanthématique dans le corps médical. [**Prophylaxis against Typhus in the Medical Services.**]—*Bull. Acad. Méd. Roumanie.* 1939. 4th Year. Vol. 8. No. 5–6. pp. 513–515.

The author strongly recommends the use of properly constructed and adjusted protective clothing for those employed in treating and dealing with typhus cases and their clothing and surroundings generally. He suggests some form of lightly made oilskin suit but whatever the material it must be louse proof ; he is not yet convinced of the degree of protection to be given by vaccination but both methods should be combined. *D. H.*

Mühlens (P.). Fleckfieber- und Rekurrensgefahren und ihre Verhütung. [**Typhus Fever and Relapsing Fever and their Prevention.**]—*Muench. Med. Woch.* 1939. Oct. 20. Vol. 86. No. 42. pp. 1523–1526. With 2 figs.

This paper, the author states, is written to help the younger medical men in Germany who have had no experience of typhus or other louse borne diseases in war time.

He gives an account of preventive measures against typhus in Bulgaria and Turkey during the war of 1914/18 and describes the usual precautions taken especially as regards lousing of cases, contacts and troops generally along with their clothing and bedding. Illustrations of a Serbian barrel and a steam disinfector of the Thresh type are given ; these both look very out of date.

A table is given showing the various types of typhus with the localities in which they occur and the vectors. Relapsing fever and trench fever are also briefly mentioned. *D. H.*

Ministry of Health. **Memorandum on the Louse and how to deal with it.** Memo. 230/Med. 12 pp. 1940. London : H.M.S.O. [2*d.*]

Dyer (R. E.). **The Rickettsioses of North America.**—*Trans. & Studies of College of Physicians of Philadelphia.* 1939. Dec. Vol. 7. No. 3. pp. 232–259. With 4 charts & 2 maps.

This is the James M. Anders lecture delivered at the College of Physicians of Philadelphia in November last.

A general summary of the subject is given and it is emphasized that of the rickettsioses mentioned in the summary two are endemic in North America, typhus and Rocky Mountain spotted fever. As regards epidemic typhus it is said that this form of typhus can be dismissed as the disease has never established itself in the country as a louse-borne disease. It is again emphasized that endemic typhus which at one time seemed to be limited to the towns along the Southern Atlantic coast has since 1932 spread more and more to rural areas. Two reasons are suggested for this spread : (1) of recent years food crops have more and more taken the place of cotton and this has

resulted in mass migration of the rat population. (2) Certain field mice have been found to be naturally infected with the virus and this may be responsible for the spread of the disease from town to country. The spread of Rocky Mountain fever from west to east is again referred to. *D. H.*

Blanc (G.) & Baltazard (M.). Longévité du virus de typhus murin dans les déjections de puces infectées. [**Persistence of the Virus of Murine Typhus in the Dejecta of Infected Fleas.**]—*Bull. Soc. Path. Exot.* 1940. Jan. 10. Vol. 33. No. 1. pp. 25–32. With 6 charts. [11 refs.]

An interesting historical account of the infectivity of the excreta of lice and fleas is given including the early work of Nicolle and of Bacot and Arkwright in Poland and Egypt.

The authors state that 1/100 milligram of the dried faeces of infected fleas is infective for man and may cause a definite febrile reaction. A sample of this dried faeces was kept in a tube so that no moisture could reach it (any such moisture quickly destroys the virus) for 651 days; after this long period it was found that the same dose of virus, 1/100 of a milligram, produced exactly the same reaction in man as it had done when freshly prepared; there was no loss of virulence whatever. This extraordinary persistence of the virus in the dried faeces of lice and fleas may explain much which has been obscure in the carry-over of infection from season to season and also from country to country. *D. H.*

Lillie (R. D.), Dyer (R. E.) & Topping (N. H.). **Cerebral Pathology in Rodents in Endemic Typhus and Rocky Mountain Spotted Fevers.** —*Public Health Rep.* 1939. Dec. 1. Vol. 54. No. 48. pp. 2137–2148. With 2 figs. on plates. [69 refs.]

It has been frequently demonstrated that the typhus virus and the virus of Rocky Mountain fever produce focal brain lesions in guineapigs, but so far definite brain lesions such as "typhus nodes" have not been described in the smaller rodents such as mice. The authors have carried out a series of experiments on these small rodents and find that characteristic typhus nodes and vascular lesions are produced in the brain in endemic typhus in the old field mouse (which has been found naturally infected) and in other species of wild mice, also in white mice and rats. The lesions seen in these rodents are comparable with those seen in guineapigs but vary in type and in distribution from species to species. In Rocky Mountain spotted fever infection similar lesions are irregularly and inconstantly produced in white mice; here also as in guineapigs the lesions are most numerous in the mid and hind brain. *D. H.*

Durand (Paul) & Sparrow (Hélène). Inoculation pulmonaire des virus typhiques et boutonneux. [**Inoculation of the Viruses of Typhus and Boutonneuse Fever into the Lungs.**]—*C. R. Acad. Sci.* 1940. Mar. 11. Vol. 210. No. 11. pp. 420–422.

White mice were inoculated intranasally with emulsion of virulent murine typhus virus. These animals died in 3 or 4 days with acute haemorrhagic pneumonia; emulsions were made from these infected

lungs and passaged through mice by the same route. Films made from the lungs showed enormous numbers of Rickettsia. If the intestinal contents of infected lice are used as inoculum and mice are inoculated in the same way exactly the same result is obtained with the virus of historic or epidemic typhus. The virus of boutonneuse fever conducts itself in the same way. *D. H.*

Delbove (P.) & Reynes (V.). Comportement d'un virus de typhus murin chez les cobayes tuberculeux. [**Behaviour of a Murine Typhus Virus in Tuberculous Guineapigs.**]—*C. R. Soc. Biol.* 1940. Vol. 133. No. 3. pp. 356–358.

This murine virus was isolated in 1933 and had been passaged 225 times and had ceased to produce orchitis in any of the guineapigs, but when inoculated into tuberculous guineapigs a typical scrotal reaction was produced in 23 out of 24 of guineapigs employed.

D. H.

Macchiavello (Atilio). Estudios sobre hematologia del tifo exantematico experimental. II. Cambios hematológicos en ratas albinas inoculadas con tifo exantemático variedad mejicana (murino). [**Blood Changes in Experimental Typhus. II. In White Rats inoculated with Mexican Murine Virus.**]—*Rev. Chilena de Hig. y Med. Preventiva.* 1939. Apr.–June. Vol. 2. No. 4–6. pp. 169–177.

The animals (white rats) were inoculated with murine typhus grown in tissues and the tunica vaginalis of infected guineapigs. The red corpuscles showed basophilia and a variable number of normoblasts and megaloblasts. The white cell changes were more definite. At first there was a leucocytosis, giving way later to moderate leucopenia. The Arneth index remained normal or, as might be expected, deviated slightly to the left at first, to the right later. In the early stages of the infection there was a high percentage of small lymphocytes, in fact nearly all seemed to be of this category ; later these were replaced by large degenerative forms, quite different from large young forms. About the sixth day a monocytosis sets in, but this, strange to say, tends to disappear in those inoculated with the cultures, but, in those inoculated with tunica emulsion, to increase till they may constitute half the total leucocytes. Turck's cells may also be seen [see this *Bulletin*, 1940, Vol. 37, p. 254]. *H. H. S.*

Blanc (Georges) & Baltazard (Marcel). Comportement du virus du typhus épidémique chez la puce du rat " Xenopsylla cheopis." [**Behaviour of the Virus of Epidemic Typhus in the Rat Flea " Xenopsylla cheopis."**]—*Bull. Acad. Méd.* 1940. Feb. 20 & 27. 104th Year. 3rd Ser. Vol. 123. Nos. 7 & 8. pp. 126–136. With 14 charts.

It is necessary that the five following proofs should be forthcoming before it can be said that a particular virus has become adapted to a selected insect host :—

1. The virus must be readily picked up, one infected feed being sufficient.
2. The duration of infection should be for the life of the insect.

3. There should be multiplication of the virus, not merely survival.
4. Above all the virus must be present in the dejecta, showing that the virus is adapted to the invertebrate host.
5. Survival of the virus in the dejecta—a test of virulence.

All these proofs have been established for murine typhus virus and the rat flea and also for the epidemic virus and the louse.

The authors have carried out a large series of experiments with the rat flea *Xenopsylla cheopis* and a virus of epidemic typhus and the same five proofs were definitely established. After a single feed on an infected animal the fleas became infected, the infection remained in the insects throughout their lives and the virus multiplied in their gut. The dejecta of the fleas were infective and remained infective for at least 100 days. There was just as good adaptation of this virus to the fleas as there was of the murine virus, or of the epidemic virus to lice.

D. H.

Lorando (N.) & Caramaouna (Ph.). Un cas de phlébite du membre inférieur au cours du typhus endémique. [**A Case of Phlebitis of the Leg in Endemic Typhus.**]—*Bull. Soc. Path. Exot.* 1940. Mar. 13. Vol. 33. No. 3. pp. 146–148.

The authors point out that although phlebitis is fairly common in epidemic typhus and in boutonneuse fever it has only once been reported previously, so far as they are aware, in murine endemic typhus. In this paper they report a typical case which they have just encountered. *D. H.*

Pfeiffer (D. H.). **Two Cases of Typhus Fever with High Agglutination Titres against X Kingsbury.**—*South African Med. Jl.* 1940. Apr. 13. Vol. 14. No. 7. pp. 141–142.

Two cases are reported of sporadic typhus, both in cleanly people. No lice were detected in either and no other cases occurred at the time.

In the first case the Weil-Felix reaction was positive for *Proteus OXK* 1/480, and negative for *X19* and *X2*. This case on the laboratory evidence was diagnosed as possibly louse-borne typhus.

The second case which gave a Weil-Felix reaction to *Proteus OX19* 1/320, *OX2* 1/120 and *OXK* 1/160 was diagnosed as probably rat flea typhus. *D. H.*

de Magalhães (Octavio) & Moreira (João Affonso). Typho exanthematico em Minas Geraes. Epidemiologia. [**The Epidemiology of Typhus in Minas Geraes.**]—*Brasil-Medico.* 1939. Sept. 9. Vol. 53. No. 37. pp. 882–891. With 4 charts, 2 maps & 1 fig.

Travassos (J.) & Dias (Emmanuel). Febre maculosa. Identidade imunologica dos virus de Minas Gerais, São Paulo e das Montanhas Rochosas. [**Spotted Fever. Identity of the Viruses of the Minas Geraes, São Paulo and Rocky Mountain Types.**]—*Mem. Inst. Oswaldo Cruz.* 1939. Vol. 34. No. 2. pp. 149–179. With 14 graphs. [11 refs.]

By an interesting series of carefully executed experiments, for details of which the original must be consulted, the authors have shown by cross-immunity tests, vaccination and other means the identity of the viruses of the spotted fever of Minas Geraes, São Paulo and the Rocky

Mountains. Their conclusions accord with the clinical pictures and the pathological anatomy, insect transmission, epidemiology, and agglutination of Proteus of the three forms of rickettsial disease.

H. H. S.

Welch (Norman A.) & Jakmauh (Paul J.). **Rocky Mountain Spotted Fever. A Case Report.**—*New England Jl. of Med.* 1939. Dec. 14. Vol. 221. No. 24. pp. 937–939. With 2 figs.

A typical case of Rocky Mountain fever with profuse rash is described. This disease was contracted in Maryland on the Columbia border. The patient, a woman, stated that about 12 days before she fell ill she had removed and crushed ticks taken from a dog. This dog had recently been imported from Texas. Guineapigs inoculated with the blood of the patient developed fever and orchitis. The residual of the rash persisted for several months ; sulphanilamide was employed but had no effect on the fever. *D. H.*

Topping (Norman H.). **Rocky Mountain Spotted Fever. Treatment of Infected Laboratory Animals with Immune Rabbit Serum.**—*Public Health Rep.* 1940. Jan. 12. Vol. 55. No. 2. pp. 41–46. With 2 charts.

The immune sera used in this series of experiments were obtained from rabbits which were injected with 2 cc. doses of Rocky Mountain fever vaccine twice a week for two weeks ; injections of living virulent tick virus were then given for some weeks ; the animals were then bled.

Guineapigs were infected by means of virulent passage virus and were then treated with 5 cc. doses of the immune serum on the 1st and 2nd day of the fever ; of 12 treated 9 recovered and 3 died, whereas of 13 controls, 12 died and only 1 recovered.

The rabbit serum was titrated against the plasma of infected guineapigs and was found to contain a large amount of protective antibodies. [See also p. 569, above.] *D. H.*

Nobécourt (P.) & Martin-Lipmann, Mme. Un cas de fièvre exanthématique. [**A Case of Typhus Fever.**]—*Bull. Acad. Méd.* 1940. Jan. 23 & 30. 104th Year. 3rd Ser. Vol. 123. Nos. 3 & 4. pp. 72–76.

A case of fever in a boy of 10—sudden onset, sore throat, and a macular rash which appeared on the third day on face and chest and limbs but not the palms or soles. There was no primary ulcer ; the fever lasted 8 to 10 days and the rash remained visible for three weeks. Polynuclear leucocytosis and positive Weil-Felix reaction 1/200 for *Proteus OX19* were found. Clinically the disease resembled boutonneuse fever but was apparently contracted in la Nièvre, in the middle of France. The vector is not known. *D. H.*

Le Gac (P.). Un cas de fièvre exanthématique observé chez un Européen résidant dans l'Oubangui. [**A Case of Typhus Fever in a European in Oubangui.**]—*Bull. Soc. Path. Exot.* 1939. Dec. 13. Vol. 32. No. 10. pp. 902–906. With 4 figs.

A very severe case of fever with an extensive rash involving the face, body and limbs including the palms and soles ; a complication during the second week was violent delirium but the patient made a

good recovery ; no primary sore could be detected. The Weil-Felix reaction after the fever had ceased gave a positive reaction of 1/500 with *Proteus OX19*, 1/1000 with *OXK* and 1/500 with *OX2*. Two guineapigs inoculated with blood taken during the fever ; both developed fever with orchitis and extreme wasting. Rickettsia bodies were seen in smears made from the swollen tunica tissue. The serum of the convalescent was tested for neutralizing power against the viruses of endemic typhus, boutonneuse fever and Rocky Mountain fever, the serum showed no neutralizing power against typhus, some slight action with boutonneuse virus and complete against Rocky Mountain fever virus. Twenty days before he became ill the patient had been engaged in a shooting expedition and had camped in a native village where ticks were numerous. The author considers that this case was probably caused by the bite of a tick and resembled most nearly Rocky Mountain fever. *D. H.*

Lewthwaite (R.) & Savoor (S. R.). **Rickettsia Diseases of Malaya. Identity of Tsutsugamushi and Rural Typhus.**—*Lancet.* 1940. Feb. 10 & 17. pp. 255–259 ; 305–311. With 7 figs. [31 refs.]
Lancet. 1940. Feb. 17. p. 319.—**The Rickettsias Simplified.**

The object of this paper is twofold : (*a*) to describe tsutsugamushi fever which although tropical is closely allied to diseases well known in non-tropical countries ; and (*b*) to try to eradicate the terms " rural typhus " and " scrub typhus." Most of the work referred to in this paper has already been published and summarized.

The main point of difference between tsutsugamushi and rural typhus is that in the one a primary sore is present, in the other no such ulcer has been found. In all other points serological, clinical, immunological, and epidemiological the diseases are identical. The authors point out that the primary sore, often an insignificant and ephemeral pimple, may be present only during the incubation period and may have disappeared before the patient is seen by a medical man ; perhaps the only evidence of the primary sore then remaining is enlargement of the lymphatic glands in the neighbourhood.

On one estate where numerous cases of " scrub typhus " and a few cases of tsutsugamushi had occurred it was found that in five of these cases in Europeans four showed primary sores and all were diagnosed as tsutsugamushi fever. Of 200 cases among the natives with whom these Europeans were working only two showed the primary sore ; otherwise the cases were identical clinically and strains of virus isolated from the two types of case were immunologically identical. Hitherto tsutsugamushi and the rural form of tropical typhus (scrub typhus) have been considered as separate diseases in virtue of the presence of a primary dermal lesion and attendant bubo in tsutsugamushi and their supposed absence in rural typhus. That is, if a primary sore was found the case was diagnosed tsutsugamushi, if no sore was found it was diagnosed scrub typhus. The clinical picture, pathology and epidemiology are described and the results of experiments are recorded. From consideration of these, especially of cross immunity tests between strains of the two clinical types, the conclusion is drawn that one and the same virus may cause various gradations of dermal lesions and that tsutsugamushi and rural typhus are identical. Rural typhus not being a disease *sui generis* this term should be discarded and the older term tsutsugamushi retained. *D. H.*

KOTTER (G. F.). Rickettsiosis onder de militairen in Atjeh. [**Rickettsiosis among Troops in Atjeh.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1940. Jan. 9. Vol. 80. No. 2. pp. 66–79. With 1 chart & 1 map.

" Tropical typhus still remains a problem in Atjeh," situated at the northern extremity of Sumatra. It appears to take a major toll of sickness, along with malaria, of military garrisons in this region. A local name applied to the disease is " Seulimeum fever " and this appears to cover the conditions Sumatra mite fever and scrub or rural tropical typhus. A table shows, for 46 cases in all, the detail of :— primary lesion ; glandular swelling ; rash ; diazo reaction in the urine ; duration of fever ; blood picture ; agglutination of typhoid, paratyphoid A and B, *Proteus OXK* and *OX 19* ; incubation period. The last datum was obtained by assuming that infection had been contracted while parties of men were on patrol duty. One of the chief questions to be answered in this analysis was whether mite fever and scrub tropical typhus were two separate diseases. The sole distinguishing point seems to consist in the presence in the one case and absence in the other of a typical punched-out ulcer with necrotic centre which is the " primary effect." A curious feature of the serum tests applied was that patients affected showed a high agglutination titre to one or other of the typhoid group organisms. This, however, was not really very extraordinary, for all the men had undergone prophylactic vaccination. Absorption tests with one or other antigen, typhoid or Proteus, left the serum titre unchanged for the other antigen. The phenomenon, therefore, could certainly not be ascribed to co-agglutination of Proteus bacilli.

The local epidemiology of the disease was followed out by taking up the patrol regions and campi[illegible] places one by one for each of the patients and this investigation seem[illegible] to show that in the regions of Koetarodja and Seulimeum one sector [illegible] particular provided nearly all the cases. Prophylaxis was attempte[illegible] for the military patrols by dusting the clothing with derris powder. The conclusions are come to that (1) there is no difference, except for primary effect, between Sumatra mite fever and scrub tropical typhus ; (2) there is a definite territory in the north of Sumatra where the chance of infection is extremely high [see also LEWTHWAITE above]. *W. F. Harvey.*

WEBSTER (W. J.). **Typhus in the Simla Hills. Part IX. Laboratory Observations, chiefly on Human XK Strains.**—*Indian Jl. Med. Res.* 1940. Jan. Vol. 27. No. 3. pp. 657–666.

This is a continuation report of the work that has now been going on in elucidating the problem of typhus in the Simla Hills and has a bearing on the general question of typhus in India and elsewhere. So far it has been possible to isolate the *Proteus X19* typhus virus from rats caught locally and this continues to be so. Also from cases of local typhus fever only the *XK* virus has been isolated and this has been again repeated. It has not been possible to isolate an *X19* virus from any cases or *XK* virus from rats or from mites caught on these animals.

It has been found recently that the smaller types of local monkeys harbour large numbers of *Trombicula delhiensis* larval mites, but so far it has not been possible to isolate any virus by inoculation of emulsions of these larval mites into guineapigs. Nor was it possible to isolate a

virus from the blood of the monkeys and the Weil-Felix reaction of their serum was also negative, nor could they be infected by injections of the human strain of *XK* virus. *D. H.*

Reynes (V.) & Richard (J.). Sur un cas de typhus tropical à forme nerveuse. [**A Case of Tropical Typhus with Marked Nervous Symptoms.**]—*Bull. Soc. Path. Exot.* 1940. Feb. 14. Vol. 33. No. 2. pp. 70–73.

This was a case of typhus in a European in Saigon in which the brunt of the attack fell on the cerebrospinal system. This attack was of short duration, some 3 or 4 days, there was loss of reflexes and paralyses of sphincters and incessant hiccup. The Weil-Felix reaction was positive to *Proteus OXK*, and a typhus virus was isolated from the cerebrospinal fluid. The patient made a rapid and complete recovery. *D. H.*

Rivoalen, Bruneau & Kernevez. Typhus tropical mortel contracté dans le Haut-Laos. [**A Fatal Case of Tropical Typhus contracted in the Haut-Laos District of French Indo-China.**]—*Rev. Méd. Française d'Extrême-Orient.* 1939. Dec. No. 10. pp. 1125–1126.

A fatal case of typhus fever without any primary sore or rash but a positive Weil-Felix reaction for *Proteus OXK* 1/5000. There was violent delirium with loss of reflexes and incontinence of sphincters. The cerebrospinal fluid showed little change and there was a mononucleosis in the peripheral blood. Death occurred on the 14th day of fever preceded by symptoms of encephalitis. *D. H.*

Mariani (G.). Caratteristiche del ceppo etiopico di *Rickettsia rocha-limae*. [**Characteristics of an Ethiopian Strain of** *Rickettsia rocha-limae*.]—*Ann. d'Igiene.* 1940. Feb. Vol. 50. No. 2. pp. 59–66. With 3 figs.

This species was recovered in one louse of 1,820 examined in Addis Ababa and in 30 per cent. of lice from the province of Gondar. The importance is not in the exactness of the figures but in the fact that *R. rocha-limae* is widespread on the Abyssinian highlands. Data from Europe and other parts are scanty and it may be that the determination of the species and characters of Rickettsia reported in association with, for instance, trachoma, has not been fully worked out and that *R. rocha-limae*, itself non-pathogenic, may be found in connexion with and erroneously regarded as the cause of pathological conditions. It is further important in that it may cause confusion in the preparation of typhus vaccine by Weigl's method from louse intestine [see this *Bulletin*, 1938, Vol. 35, p. 793].

Details of the distribution in louse colonies are given. The Rickettsia are polymorphic, occur in clumps or chains, are only partially Gram-negative and occur in very large numbers in louse intestine and faeces. These characters should serve to differentiate them from *R. prowazeki* and *R. mooseri*. Experimental infection of laboratory animals gave consistently negative results ; in two human experiments infection was also negative. Lice fed on infected animals showed no sign of infection. Inoculation with *R. rocha-limae* gave no protection against the pathogenic Rickettsia.

The natural infection of lice with *R. rocha-limae* makes it imperative that research on the causation of disease or on the preparation of vaccines, in which lice are employed, must be carefully controlled. The author refers to the possibility that CUÉNOD and NATAF [this *Bulletin*, 1937, Vol. 34, p. 900] working on trachoma, may have fallen into an error of this kind. *C. W.*

DURAND (Paul) & GIROUD (Paul). Essais de vaccination contre le typhus historique au moyen de Rickettsias tuées par le formol (souches pulmonaires). [**Attempts at Vaccination against Epidemic Typhus with Rickettsia killed by Formalin.**]—*C. R. Acad. Sci.* 1940. Mar. 27. Vol. 210. No. 13. pp. 493–496.

The method employed was to make emulsions of the lungs of guineapigs and rabbits which had been infected by the nasal route with the virus of epidemic typhus ; these emulsions were suspended in 2 per cent. formalin in normal saline and frequently centrifuged ; the Rickettsia were then suspended in human or horse serum with formalin.

Series of guineapigs were inoculated with vaccine and later tested ; those series which had received repeated doses of vaccine were solidly immune. "The number of injections is of much more importance than the size of the dose." Monkeys also were protected and 12 volunteers were inoculated with 3 doses of vaccine without inconvenience. In all cases positive Weil-Felix reactions resulted after vaccination. Also emulsions of *R. prowazeki* were agglutinated and neutralizing antibodies were demonstrated in the serum of the vaccinated people. *D. H.*

ZIA (Samuel H.), PANG (K. H.) & LIU (P. Y.). **Studies on Typhus Vaccine prepared from Agar-Tissue Culture.**—*Amer. Jl. Public Health.* 1940. Jan. Vol. 30. No. 1. pp. 77–84. With 2 charts & 1 fig. [15 refs.]

The Rickettsia of epidemic typhus used in these experiments were grown in agar surface tube cultures ; the agar used was firmer than described in previous papers [ZINSSER, FITZPATRICK and WEI, this *Bulletin*, 1939, Vol. 36, p. 1002]. Human serum Tyrode solution was employed and sterile mouse embryo tissue. Heavy growths were obtained after 14 days' incubation ; these were washed off and killed by addition of Merthiolate and carbolic. This vaccine was found to be non-infectious but capable of producing positive Weil-Felix reactions in rabbits and in men. Furthermore, if given in sufficient amount it protected several series of guineapigs completely against subsequent infection. *D. H.*

TCHANG (J.) & MATHEWS (G. B.). **Culture of Rickettsiae of the Chinese Typhus in the Yolk Sac of Developing Chick Embryo.**—*Chinese Med. Jl.* 1940. Jan. Vol. 57. No. 1. pp. 47–50.

The inoculum 0·5 cc. of infected tissue emulsion was injected into the yolk sac just below the air sac and avoiding the embryo itself which must live for a further period of several days at least. The eggs were then returned to the incubator.

Results.—The virus developed better in the yolk sac than in the embryo itself. The best results were obtained by inoculation of emulsion of brain of infected guineapigs—so numerous were the Rickettsia in the cultures that it is proposed to use this method for the preparation of vaccines. *D. H.*

Zinsser (Hans), Plotz (Harry) & Enders (John F.). **Mass Production of Vaccine against Typhus Fever of the European Type.**—*Science.* 1940. Jan. 12. Vol. 91. No. 2350. pp. 51–52. [16 refs.]

An account is given of previous methods of preparation of vaccines against typhus.

The present method described by the authors is a mixture of culture obtained by direct inoculation of egg yolk sac and agar surface tissue culture on large surfaces. The inoculum is obtained from the egg yolk cultures and minced chick tissue is infected and spread over the agar surfaces; by this means profuse growths of Rickettsia are produced.

D. H.

Cox (Herald R.) & Bell (E. John). **Epidemic and Endemic Typhus: Protective Value for Guinea Pigs of Vaccines prepared from Infected Tissues of the Developing Chick Embryo.**—*Public Health Rep.* 1940. Jan. 19. Vol. 55. No. 3. pp. 110–115.

Vaccines of typhus virus were prepared from the infected tissues of developing chick embryos in the manner already described by the authors for Rocky Mountain fever. It was found that most of the inoculated guineapigs were protected against epidemic typhus virus; but the protection against endemic typhus virus was not so efficient although this endemic typhus vaccine did produce some active immunity. It was found possible to obtain 550 cc. of vaccine from two infected eggs when all the embryonic tissues were used [see also this *Bulletin*, 1939, Vol. 36, p. 984; 1940, Vol. 37, p. 268]. *D. H.*

Blanc (Georges) & Baltazard (Marcel). La vaccination contre le typhus exanthématique par virus vivant. Son application au Maroc. [**Vaccination against Typhus with a Living Virus in Morocco.**]—*Rev. d'Hyg. et de Méd. Préventive.* 1939–1940. Vol. 61. No. 9. pp. 593–610. With 3 figs. [Bibliography.]

The arguments for use of a living virus and against the use of killed virus are as follows. If killed vaccine is used it is necessary to give 3 or 4 doses of vaccine and this only produces a brief period of immunity, whereas a single dose of living virus gives as good protection as does an attack of fever. So far there is no evidence whatever that murine typhus (the virus employed) is spread from the vaccinated people. The virus is so attenuated by treatment with bile that it produces only an inapparent attack in Moroccans with solid and lasting immunity, not only to the virus employed in the vaccine and other strains of murine typhus virus but also to the epidemic virus. These facts have been proved by experiment; in one case a man who had been vaccinated five years previously was found to be immune to injections of the epidemic virus. The present method of vaccine preparation is by the use of the dried excreta of infected fleas. Fleas are fed on infected white rats and the faeces are collected and dried *in vacuo*,

the dried excreta are kept in this state until required for inoculation. The dose of vaccine is 1/100 milligram modified by the action of bile so that no apparent reaction results in man but if the same vaccine is inoculated intraperitoneally into guineapigs it produces fever and orchitis in these animals, thus demonstrating that the infectivity has not been in any way altered by the action of the bile. As stated in the paper by Blanc above the infectivity of the virus persists in the dried material for at least two years and can be used during this period for preparation of vaccines. *D. H.*

Finlayson (M. H.) & Grobler (J. M.). **A Study of South African Epidemic Typhus Strains and the Protection afforded by the Zinsser-Castaneda Vaccine against Infection with these Strains.**—*South African Med. Jl.* 1940. Apr. 13. Vol. 14. No. 7. pp. 129–134. With 1 chart. [13 refs.]

Two local strains of epidemic typhus virus were investigated and the results agree with those of other workers elsewhere. An interesting and important observation made was that guineapigs inoculated with a killed vaccine prepared in Mexico from a strain of murine typhus were protected against infective doses of the local epidemic virus. It is suggested that such a killed vaccine might be usefully employed in the protection of the large native population in South Africa among whom typhus fever is endemic. *D. H.*

Finlayson (M. H.) & Grobler (J. M.). **A Study of Some Properties and Relationships of South African Murine Typhus Strains and the Protective Action of Zinsser-Castaneda Vaccine against South African Murine Typhus.**—*South African Med. Jl.* 1940. Apr. 13. Vol. 14. No. 7. pp. 134–139. With 1 chart. [25 refs.]

Two strains of virus of murine typhus isolated from rats in the Cape Province were closely investigated and compared with two strains of the South African epidemic typhus virus. The authors agree with the opinion already expressed by Gear that the viruses of endemic and epidemic typhus in South Africa are immunologically identical. But they also note that there are certain differences in the action of their murine viruses on experimental animals as compared with similar viruses in Europe and elsewhere, thus the local virus produced only an inapparent infection in rats and in mice. A single dose of a vaccine prepared from a Mexican strain of murine virus protected 75 per cent. of guineapigs against the local immune virus and 3 doses of vaccine protected 100 per cent. of the animals, thus showing a considerable immunological relationship between the two viruses.

D. H.

British Medical Journal. 1940. May 25. pp. 855–856.—**Immunization against Typhus and Other Rickettsial Infections.**

Andruzzi (R. M. A.). Storia, sviluppo e stato attuale della vaccinazione contro il tifo esantematico. [**The History, Development and Present Position of Vaccination against Typhus.**]—*Ann. di Med. Nav. e Colon.* 1940. Jan.–Feb. Vol. 46. No. 1–2. pp. 47–65.

BARTONELLOSIS AND OTHER FEVERS.

Précis of Abstracts in this Section.

Patiño Camargo (p. 582) gives an account of the Guáitara outbreak of bartonellosis which caused heavy mortality in epidemic fashion in 1938. There was irregular fever with rheumatic pains followed by a verruga eruption appearing 30 to 60 days after the onset. Anaemia developed rapidly and Bartonella were present in the blood. Evidence seemed to point to the louse as the vector. Treatment with calcium, vitamins, arsenic and antimony gave excellent results. Ortega (p. 583) amplifies the clinical picture of this fever, pointing out that the appearance of the verruga nodules is a favourable sign.

Rivoalen *et al.* (p. 584) give an account of an outbreak of a five-day fever in Hanoi. The temperature was of the saddle-back type and there was a strong mononuclear increase in the blood. It is thought that Psychodidae may have been the vectors. *C. W.*

Patiño Camargo (Luis). Bartonellosis en Colombia. Bartonellosis de Guáitara o fiebre verrucosa del Guáitara. [**Bartonellosis in Colombia. Guáitara Fever.**]—*Rev. Facultad de Med.* Bogotá. 1939. Apr. Vol. 7. No. 10. pp. 467–501. With 14 figs. & 6 charts. [14 refs.]

Oroya fever and verruga peruana have been hitherto regarded as limited to certain valleys of the western slopes of the Andes, that is to Peru, Ecuador, Bolivia and Chile. In view of the facts recorded in this article we must revise or supplement our knowledge of the epidemiology of bartonellosis. The account has also some historical interest.

Early in 1936 the health authorities of Nariño were perturbed by an outbreak, with high fatality, occurring in the watersheds of Juanambú and the Mayo river and suddenly invading Guáitara. The disease was first thought to be malaria but quinine, even in large doses, proved ineffectual. In February 1938, Dr. Augusto Gast of the Yellow Fever Service was sent down, there being a suspicion that the disease was of that nature. In the municipality of San José, among a population of 5,095 there had been 90 deaths in 1936, 194 in 1937, and in January 1938, 16, and in the first half of February, 24. Forty samples of blood were taken but proved negative as regards yellow fever. Next came the announcement, " In Ancuya, in both urban and rural districts, is raging an epidemic resembling typhoid fever, causing a high mortality. The disease in Samaniego, Consacá and Sandoná is the same as this ' pestilence of Ancuya'. " At this stage the author was ordered to proceed to Nariño, to determine the nature of the outbreak, to put in hand emergency measures in accordance with his diagnosis, and to prepare a scheme to combat it for consideration of the National Government.

The area involved was 50 by 20 kilometres and comprised 13 municipalities and about 100,000 total population. The outbreak started in the deeper cañons of the north-west and south-west of the volcano Doña Juana, as stated above. From the very beginning the fatality was high ; settlements with an average in normal times of 8 deaths a month, now registered 64 in a single month. In the first nine months of 1938 there were 1,800 deaths from this cause, and altogether the

victims were estimated to number over 4,000 ; in 1938 in Ancuya itself 466 died out of a total population of 6,846, or 6·5 per cent.

Clinically, it differed somewhat from the classical description in which verruga is, as it were, a type of bartonellosis, with very low fatality and Oroya fever the highly fatal febrile type. The Guáitara fever was characterized by irregular and remittent fever at the beginning, with rheumatic pains and anaemia, followed by a verruga eruption. Symptoms in the stage of invasion were intense headache, and pain in back and limbs, asthenia, tachycardia, praecordial pain, dyspnoea and pallor. Often there were hyperaesthesia, sweats, epistaxis and other haemorrhages, petechial and macular, and albuminuria ; less common were cough, vomiting, diarrhoea, and stupor. The eruption would appear at any time from 30 to 60 days after the fever and might be scarce or multiple, discrete or confluent, on face and exposed parts, rarely on the mucosae. The lesions varied from milia in the skin, to hard, painless nodules in the subcutaneous tissue, or even to tumours as large as a lemon which usually ulcerated later. The blood showed poikilocytosis, with megalocytes and normoblasts ; the reduction of red cells might be rapid, the counts on three successive days in one patient were 1,400,000, 1,300,000 and 1,000,000 per cmm. Blood examination showed the presence of Bartonella. Medical treatment comprised removal to hospital, and the giving of calcium, " vitamins [not specified] and small doses of organic arsenic and antimony . . . with, according to hospital records, excellent results." No details of treatment are given.

Examination of lice from the patients and experiments on animals (curi, ? guineapig) seemed to point to the louse as the vector.

H. H. S.

Ortega (Julio). Informe general sobre la campaña antiepidemica del distrito de Samaniego, en el departamento de Nariño.—*Rev. de Higiene.* Bogota. 1939. Nov. & Dec. Vol. 20. Nos. 11 & 12. pp. 49–62. With 5 figs. [La epidemia del Guáitara. [**The Guáitara Outbreak.**] pp. 54–62.]

The outbreak referred to here has already received notice in this *Bulletin* [1940, Vol. 37, p. 271 and see preceding abstract], but this more recent account supplements the former and amplifies it in several particulars. Deaths resulting from it from June 1938 onwards were in successive months 4, 8, 9, 7, 15, 16, 37, and in the first four months of 1939, 50, 58, 65 and 67 respectively. No age is exempt, both sexes, all races and persons of all economic and social states are attacked ; the valleys, especially damp and marshy parts, are commonly invaded. The following are given as characteristic symptoms [it will be seen that others are mentioned in the former account and some are given here which were not in the previous note] : 1. Formication of spine and limbs, especially in fingers and toes, furred, moist and tremulous tongue, heaviness of the eyes and pain in the neck, precordial pain, at times acute, headache and general pains, enlargement of liver and spleen, icteric tint in the conjunctivae, pain and gurgling in the right iliac fossa, general prostration, drowsiness in some, wakefulness in others, and nightmares on dropping off to sleep, marked feeling of anxiety, fever of an undulant type with abrupt transitions ranging between 36° and 41°C. There are cold, clammy sweats, constipation, changing in severe and fatal cases to uncontrollable diarrhoea ; a rash of purpuric

spots or of larger haemorrhages; there may be a verruga-like condition in convalescence. This last is looked upon, strange to say, as of good prognosis; so far no death has occurred among those presenting the "verruga type." In a few a tetanoid state recurs, with trismus and difficulty in swallowing; these rarely recover.

The author concludes that the disease is autochthonous, that it is infective and probably transmitted by some blood-sucking insect, all races, ages and both sexes are susceptible, diagnosis is made on clinical and bacteriological grounds (Bartonella); the verruga form with cutaneous manifestations is benign. *H. H. S.*

Rebagliati (Raúl). Geografía de la enfermedad de Carrión. Verruga peruana—Fiebre de la Oroya. [**The Distribution of Carrión's Disease.**] —*Bol. Dirección de Salubridad Publica.* Lima. 1938. pp. 25–71. With 5 figs.

Rivoalen, Marliengeas, Marty & Saint-Etienne. Notes sur une épidémie de fièvre des 5 jours observé à Hanoi au cours de l'été 1939. [**Outbreak of a Five-Day Fever at Hanoi in 1939.**]—*Rev. Méd. Française d'Extrême-Orient.* 1939. Nov. No. 9. pp. 1175–1177.

In the latter half, beginning of July to the end of November, of 1939 the authors observed in various parts of the Tonking delta—Haiphong, Nam-Dinh, Bac-Ninh, etc.—an outbreak of fever characterized by malaise, fever, backache, of sudden onset with temperatures 39°–40°C., sometimes with diarrhoea or obstinate vomiting and pain in the eyes without congestion. Each year a few such cases are seen, but this time the disease assumed epidemicity. Commonly the temperature would begin to drop on the third day, run up again on the fifth day as a prelude to the final defervescence. On the fifth day, often after defervescence, an itching papular erythema might appear over the whole body, but more marked on the limbs. The spleen would become palpable, and the blood after an early relative polynucleosis showed a strong mononuclear increase at expense of polymorphonuclears which fell to 24 per cent., the formula closely resembling that of infectious mononucleosis. There is no leucocytosis. Convalescence is rapid, weakness lasting for another 4–5 days only and relapse does not occur. From the time of year—that at which Phlebotomus is abundant—Psychodidae are suspected as vectors, but this needs further investigation. *H. H. S.*

HELMINTHIASIS.

Précis of Abstracts in this Section.

Cestodes.—Barnett (p. 586) gives figures of the incidence of hydatid disease in man, sheep and cattle in New Zealand. The majority of human infections are in the liver and lungs. Senekji and Beattie (p. 587) report on hydatid disease in Baghdad.

Riley (p. 587) shows that wolves in the United States harbour *E. granulosus* and that the moose is an intermediate host. Neghme Rodríguez (p. 587) found *E. granulosus* in 21·18 per cent. of stray dogs in Santiago.

Ivanissevich (p. 587) points out the importance of early diagnosis in hydatid disease of the lung and advocates X-ray examination of all children and of all patients consulting doctors in the endemic areas of the Argentine. Operation should be performed early, before the cyst has time to burst into a bronchus. Iturraspe (p. 588) discusses the condition in which after the emptying of a pulmonary hydatid cyst the true cyst wall of the parasite is not completely removed. This may lead to haemoptysis or periodic bronchorrhoea and there is a characteristic appearance on lateral X-ray examination. Treatment is surgical removal but this is not justified unless the natural process is unsatisfactory, as when septic fluid is retained. Costa (p. 588) reports two patients with pulmonary hydatid disease both of whom recovered after the cysts had burst into the air passages. Chopra *et al.* (p. 588) report on a case in India. Chifflet (p. 589) shows that cysts in the upper and lower thirds of the abdomen may cause severe pressure symptoms while those in the mid zone do not. Post-operative suppuration may attack cysts remote from the site of operation and in multiple abdominal infection, therefore, the cysts of the upper and lower abdomen, which are less accessible than those of the mid zone, should be dealt with first. Piaggio-Blanco and Garcia-Capurro (p. 589) describe successful treatment of a pancreatic hydatid by marsupialization.

Castex *et al.* (p. 589) give a description of a case of hydatid disease of the kidney, with marked Casoni reaction and eosinophilia of 3 per cent. McClements (p. 590) records hydatid of the kidney and pleura. Prat and Lopez-Gutierrez (p. 590) describe a hydatid cyst of the iliacus muscle treated by scraping. In hydatid disease of both bones of a knee joint, Larghero-Ybarz (p. 590) considers that the infection spread from one bone to the other by the synovial membrane. Tenhaeff and Ferwerda (p. 591) give the results of their attempts to induce experimental echinococcosis in white mice.

Menon and Veliath (p. 591) describe the tissue reaction round cysticerci in various organs, including the brain.

Nematodes.—Timpano (p. 592) claims to have found *Necator americanus* on two occasions in Italy.

Bruni (p. 592) has found an active diffusion factor in *A. duodenale* ground in saline, and concludes that hookworm anaemia is due to a parasitic toxin. Hoff and Shaby (p. 592) report subacute combined degeneration of the cord caused by severe hookworm anaemia and successfully treated with iron, liver extract and vitamin B_1.

In the plasma of patients with ankylostomiasis and oedema Zainal *et al.* (p. 592) found a definite decrease of albumin and an increase of globulin. There is therefore a reduction of the colloid osmotic pressure. The decrease of albumin may be due to shortage of protein in the food, and deficient absorption from the intestine may also play a part. Otto (p. 593) has found that the serum of dogs actively immunized by repeated infection contains an antibody of considerable potency against hookworm larvae, and remarks that the same phenomenon must be considered in the study of human disease.

Otto and Landsberg (p. 593) conclude from experiments on dogs that in the treatment of hookworm anaemia a balanced and adequate diet is more important than iron therapy. In comment Lane points out the parts played by the intrinsic and extrinsic factors, and by iron, in the formation of erythrocytes. Haddad (p. 594) gives details of methods of treatment adopted in various worm infections. Cavallero

(p. 595) gives the results of a study of the pathological conditions induced in the liver of white rats by acute and chronic poisoning with carbon tetrachloride administered by inhalation, and of the effect of injection of colchicine on this poisoning. The action of colchicine is to increase mitosis.

Hare (p. 596) gives the findings on which he bases his conclusion that the provision of family bore-hole latrines has reduced the incidence of hookworm infection in coolie lines in Assam. Reinfection still occurs but is probably acquired in fields and houses, and not in latrines, and will therefore gradually die out.

Duvoir *et al.* (p. 596) treated a woman suffering from polycythaemia by infecting her with hookworms. A marked reduction of red cells was effected but was not maintained after expulsion of some of the worms.

C. W.

Mario Alonso (Luis). Introductión al estudio de la equinococosis. (Biología y patología general.) [**Introduction to the Study of Echinococcosis.**]—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1939. Vol. 15. No. 129. pp. 745–886. With 98 figs. [152 refs.]

This work was the thesis presented by the author for his doctorate. The preparation and writing of it occupied him for nearly three years. It deals with the biology and general pathology only and is very detailed and interestingly written and abundantly illustrated. It comprises an excellent account of practically all the known facts on the subject with which the author professes to deal, and due acknowledgment is given to writers of nationalities other than that of the author. The exposition is clear and the illustrations excellently reproduced. The author is to be congratulated on the outcome of his labours.

H. H. S.

Barnett (Louis). **The Incidence and Prevention of Hydatid Disease in New Zealand.**—*New Zealand Med. Jl.* 1939. Aug. Vol. 38. No. 206. pp. 256–262.

In great part this is a report on hydatid infection in New Zealand during 1938, particularly as compared with 1937 (given in brackets). In public hospitals there were treated 116 (126), the most notable differences being Palmerston North 1 (21), Timaru 1 (17) and Wellington 2 (33). In private hospitals the figures were 28 (36). The prevalence of hydatid or tenuicollis cysts among the 31 million sheep and 4¼ million cattle is great : " I am well within the mark when I say that more than half of those that reach adult life have their livers and lungs studded with cysts " of one or both sorts. The preventive campaign in dogs is by arecoline tablets ; the newspapers have published adverse reports, those of dog owners, farmers' unions and veterinary officials have been almost universally favourable ; but it is evident that the instructions given with the drug are insufficiently clear.

The Hydatin Registry of the Royal Australian College of Surgeons which covers Australia and New Zealand shows for 1938 the number of reported infections as 1,304 and of deaths as 151, the largest figures being 787 liver cysts with 98 deaths and 260 lung cysts with 20 deaths, but in many instances more than one part of the body is involved, liver

and peritoneal cavity, and liver and lung being the commonest. It is pointed out how the better filing of index cards could improve the accuracy of returns. *Clayton Lane.*

Senekji (H. A.) & Beattie (C. P.). **The Incidence of Hydatid Disease in Iraq.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1940. Jan. 29. Vol. 33. No. 4. pp. 461–462.

The percentage with hydatids of 34,146 persons admitted to the Royal Baghdad Hospital from 1935 to 1938 was 0·313 (1 in 319), of 2,347 sheep and goats slaughtered it was 11·93, of 223 cattle 24·66, and the infection was present in the one camel examined. The adult *Echinococcus granulosus* was found in 17·83 per cent. of 123 street dogs. *C. L.*

Riley (W. A.). **Maintenance of Echinococcus in the United States.**—*Jl. Amer. Vet. Med. Assoc.* 1939. Vol. 95. pp. 170–172. [16 refs.] [Summary taken from *Vet. Bull.* 1940. Mar. Vol. 10. No. 3. pp. 182–183. Signed D. D. Ogilvie.]

Autopsy of a large number of wild mammals showed that the maintenance of hydatid infection of wild animals in the United States is in all probability due to the fact that wolves play the part of reservoir hosts. In the present study 5 out of 12 wolves examined harboured adult worms. The intermediate host of the parasite in many cases appears to be the moose, and cysts were found in the lungs of 11 of the 21 of these animals which were examined.

Neghme Rodríguez (Amador). La equinococosis y otros enteroparasitos de los perros vagos de Santiago. [**Echinococcus Infections and Other Intestinal Parasites of Stray Dogs in Santiago.**]—*Rev. Chilena de Hig. y Med. Preventiva.* 1937. Jan.–Dec. Vol. 1. No. 1. pp. 60–62.

Of 406 homeless dogs which were killed and examined in Santiago de Chili, 21·18 per cent. had *Echinococcus granulosus* in their intestines. The occasional parasite of man *Dipylidium caninum* was present in 56·06 per cent. and " Dochmius canis " in 41·8 per cent. *C. L.*

Ivanissevich (Oscar). Tratamiento de los quistes hidatídicos del pulmón. [**Treatment of Hydatid Cysts of the Lung.**]—*Bol. Inst. Clin. Quirúrg.* 1939. Vol. 15. No. 128. pp. 497–609. With 32 figs. [248 refs.]

This report on treatment of hydatid of the lung is accompanied by 93 case histories. It was delivered at the 10th Annual Congress of the Argentine Association of Surgery held at Buenos Aires in October 1938.

Surgical interference with hydatid of the lung should be early and complete. It should be early because, for example, if the cyst empties itself through the bronchi, bronchial epithelium grows down and lines the cyst, with the formation of a permanent cavity. To avoid this and other complications by early diagnosis, recourse should be had to X-rays used on all children and on all patients who consult a doctor in endemic areas, for these make evident all cysts with a diameter of over 5 centimetres. That is the time to operate. There is detailed

a consideration of the different conditions which may be found at, and of the means that make for success in, operation : pneumothorax, shutting off of the pleura, its drainage, raised air tension in the bronchi, complete evacuation of the parasite, closure of the lung cavity done rightly or wrongly, its marsupialization, and even lobectomy.

C. L.

Iturraspe (Miguel Correa). Quistes hidatídicos del pulmón. Membrana encarcelada. [**Hydatid Cyst of the Lung. Retention of Membrane after Expulsion of the Contents.**]—*Bol. Inst. Clín. Quirúrg.* 1939. Vol. 15. No. 128. pp. 643–697. With 14 figs. [28 refs.]

The author is dealing with 24 instances in which after the emptying of a hydatid cyst of the lung the true cyst wall of the parasite itself was not completely removed [wås retained as the placenta may be retained].

The frequency of this condition is put as 20 per cent. of hydatid cysts of the lung observed by X-rays. It may occur when a cyst opens into the air passage or when a surgical operation has failed to get rid of the whole of the parasite. That, after rupture, the parasite degenerates has not been fully demonstrated ; when some of the cyst is retained in the lung the essential symptoms are haemoptysis or periodic bronchorrhoea or both ; but it is on the X-ray picture that stress is here laid. The exposure must be made laterally, not antero-posteriorly, and its value depends on the fact that the branches of the bronchial tree, as so viewed, are spread out over the cyst, that when this bursts and the lung shrinks these structures do not share in the collapse of the cavity ; this accordingly takes on a polygonal outline (when seen laterally), the bronchial branches lying at the angles, and that outline is made evident on the plate by the shadow of the relatively opaque wall of the crumpled cyst. The treatment is the removal of the dead cyst either naturally or surgically, but surgical interference is not justified unless the natural process is unsatisfactory, as for example when there is retention of septic fluid. *C. L.*

Costa (Alberto). O quisto hidático do pulmão e a vómica curativa. [**Spontaneous Cure of Pulmonary Hydatids by Expectoration of their Contents.**]—*Africa Méd.* Lisbon. 1939. Oct. Vol. 5. No. 10. pp. 201–214. With 5 figs.

Two cases are reported in which hydatid cysts burst into the air passages and the contents were expectorated. Both recovered, with fall of eosinophils from 12·9 to 3·9 and from 37·3 to 3·5 per cent.

C. L.

Chopra (R. N.), Pasricha (C. L.) & Lal (S.). **Hydatid Disease of the Lungs. A Case Report.**—*Indian Med. Gaz.* 1939. Oct. Vol. 74. No. 10. pp. 621–622. With 1 fig.

In view of the fact that only two cases of hydatid of the lung have been reported in India the authors note that 10 years ago a patient now seen by them had a diagnosis of this condition. An X-ray photograph now taken shows a denser and slightly larger shadow than that of 10 years back. The Casoni intradermal reaction was well marked. Eosinophilia was 3 per cent. *C. L.*

Chifflet (Abel). Táctica operatoria en la equinococosis peritoneal múltiple. [**Surgical Technique in Multiple Hydatid Cysts of the Peritoneum.**]—*Arch. Uruguayos de Med., Cirug. y Especialidades.* 1939. Sept. Vol. 15. No. 3. pp. 211–221. With 4 figs.

From the surgical viewpoint the abdomen, so far as concerns multiple peritoneal hydatid cysts, falls into 3 zones. The mesoabdominal zone lies below the mesocolon and above the pelvis and in it cysts, by reason of the slightness of the reaction round them, are easily ruptured by accident or even by a surgeon's too firm palpation, and do not produce pressure symptoms on rupture into organs. On the other hand, cysts in the thoracico-abdominal zone may produce grave insufficiency of the liver and ulceration of surroundings with intrapleural rupture ; while pelvic cysts may cause compression of the pelvic organs.

In surgical treatment, suppuration is the matter which needs to be first in mind. If a cyst is suppurating it is that cyst that needs immediate operation. But apart from this, post-operative suppuration about cysts remote from the site of operation, and showing itself 6 to 10 days later as an inflammation caused by circulating bacteria, must be in mind ; and if the cysts so attacked are in the upper or lower abdominal zones they are more serious and less open to surgery then than if they had been earlier dealt with. Accordingly, it is cysts in these parts which should first be treated by the surgeon when the hydatid infection is by multiple abdominal cysts. *C. L.*

Piaggio-Blanco (Raúl-A.) & Garcia-Capurro (Federico). Quiste hidatídico de la cabeza del páncreas. Importancia de la radiología para su diagnóstico. [**Hydatid Cyst of Head of Pancreas. The Importance of X-Rays in its Diagnosis.**]—*Arch. Uruguayos de Med., Cirug. y Especialidades.* 1939. Sept. Vol. 15. No. 3. pp. 245–251. With 4 figs.

A lad of 17 had a circumscribed tumor below the right costal margin with vomiting, some jaundice, deeply coloured urine and lightly coloured faeces. X-ray plates showed gastric dilation. Operation allowed of the successful treatment of this pancreatic cyst by marsupialization. *C. L.*

Castex (Mariano R.), Maggi (Alberto) & Orosco (German). Hidatidosis renal y pararrenal. [**Renal and Pararenal Hydatid Cysts.**]—*Prensa Méd. Argentina.* 1940. Feb. 7. Vol. 27. No. 6. pp. 283–294. With 4 figs. [73 refs.]

The hydatid cysts complicated diabetes. A man of 34 had lumbar pain for six months and on admission to hospital had an enlarged abdomen and glycosuria, of 27·5 per thousand. A month before admission he had begun to pass hydatid material without pain but with a feeling of urethral obstruction. Sixteen days later there was haematuria with colicky pain and expulsion of cysts, and on admission a large tumour about the left kidney, passage of membrane, vesicles and hooks through the left ureter with diminished quantity of fluid and of urea passing through that ureter. The Casoni reaction was marked and there was eosinophilia of 3 per cent. among white cells numbering 10,000. X-rays showed a cyst in the upper part of the left kidney and another smaller one above this beside the spinal column. *C. L.*

McClements (S.). **A Case of Hydatid Disease.** [Memoranda.]—*Brit. Med. Jl.* 1939. Dec. 9. p. 1140.

During life a man of 72 who had been in poor health on and off for over 30 years, passed in the urine a hydatid cyst with scolices and hooklets. The left kidney was " replaced by a large number of hydatid cysts about the size of marbles," as was revealed on his death, and like material was then found in a left pleural effusion. *C. L.*

Prat (D.) & Lopez-Gutierrez (J. C.). Hidatidosis primitiva de la logia del psoas ilíaco derecho. (Quiste hidático del psoas ilíaco.) [**Primary Hydatid Cyst of the Right Iliac-Psoas Muscle.**]—*Arch. Uruguayos de Med., Cirug. y Especialidades.* 1939. June. Vol. 14. No. 6. pp. 576–585. With 1 fig. [11 refs.]

Professor Dévé has told the authors that a hydatid cyst of this region is not so rare as they thought, but that this is a new observation inasmuch as it was treated as such.

The swelling in the right iliac fossa was, by its resistance, the mobility of the spinal column and by being palpable per rectum, suspected of being hydatid. An incision outside the right rectus and reflection of the peritoneum displayed the iliacus muscle. After protection by cloths the cyst was opened through this and the cavity scraped. Fluid and membrane escaped. *C. L.*

Larghero-Ybarz (P.). Patogenia de la hidatidosis bi-epifisaria de las articulaciones. (Intervención de los ligamentos intra-articulares.) Los ligamentos cruzados como vía de propagación de la infección parasitaria de una epífisis a la otra de la articulación de la rodilla. [**The Pathogeny of Hydatid Infection of Both Epiphyses of a Joint.**]—*Arch. Uruguayos de Med., Cirug. y Especialidades.* 1939. Dec. Vol. 15. No. 6. pp. 545–617. With 2 protocols & 59 figs.

In a knee joint there was hydatid infection of both femur and tibia, that in the former being held to be the older. Professor Ivanissovich has had a similar case of infection of both these bones. The method of infection is discussed. It is concluded that simultaneous infections by two blood-borne embryos is unlikely, and that spread from one bone to the other was not along the crucial ligaments but by the synovial membrane. The view is based on the findings illustrated in the profuse and clear photographs which accompany the paper. *C. L.*

Chandra (Hukam). **A Hydatid Cyst in the Neck.**—*Indian Med. Gaz.* 1940. Feb. Vol. 75. No. 2. pp. 95–96.

One large and two small hydatid cysts, identified by hooklets when excised, are reported in the left side of the neck of a boy of six.

C. L.

Camaüer (Armando F.). Consideraciones sobre cinco casos personales de equinococosis raquídea. [**Five Cases of Spinal Hydatid.**]—*Prensa Méd. Argentina.* 1939. Dec. 20. Vol. 26. No. 51. pp. 2482–2487. With 6 figs.

Rubegni (Renato). Sulla possibilità di un viraggio della reazione di Casoni dopo intradermoreazioni ripetute. [**The Possibility of Changes in the Casoni Reaction as a Result of Repeated Intradermal Tests.**]—*Policlinico.* Sez. Prat. 1939. Oct. 23. Vol. 46. No. 43. pp. 1859–62, 1865–7. [17 refs.]

Tenhaeff (C.) & Ferwerda (S.). Experimenteele echinococcose. [**Experimental Echinococcosis.**]—*Tijdschr. v. Diergeneesk.* 1940. Feb. 1. Vol. 67. No. 3. pp. 124–131. With 5 figs. on 3 plates. English summary.

"In imitation of Prof. Dévé of Rouen and the Belgian workers de Waele and de Cooman the authors also tried to evoke echinococcosis experimentally. As experimental animal they used white mice in which they injected (according to the prescription of Dévé) intraperitoneally the solid parts from the Echinococcus cysts (Echinococcus-' sand '). The percentage of positive results so obtained was considerably smaller than the percentage obtained by the investigators mentioned above.

"The authors give as their opinion that the principal cause of this difference is the fact that they used ' sand ' from old cysts, the scolices of which were dried or had only a small vitality.

"The favourable results of meat inspection, by which the percentage of Echinococcus in slaughter animals decreased and the number of new infections therefore was less frequent, were the cause of the less favourable results of this research.

"The symptomatology and the pathological-anatomical picture of the positive cases corresponds with those descripted by Dévé.

"A therapy with dohyfral in order to obtain a calcification of the cysts had no results."

Gordon (Hugh McL.). **The Occurrence of *Diphyllobothrium latum*, the Broad Fish Tapeworm, in Dogs in Australia.**—*Australian Vet. Jl.* 1939. Dec. Vol. 15. No. 6. p. 256.

Menon (T. Bhaskara) & Veliath (G. D.). **Tissue Reactions to *Cysticercus cellulosae* in Man.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1940. Mar. 20. Vol. 33. No. 5. pp. 537–544. With 12 figs. on 4 plates. [14 refs.]

A study on three autopsies made in Madras and Vazagapatam (South India) on those dying of cysticercus infection. All showed infection of the brain, and one of heart, diaphragmatic, pectoral and intercostal muscles with fatty degeneration of liver and kidneys.

"It is demonstrated that the nature of the tissue reaction is similar in the brain and the other organs and consists in the formation of a capsule of mesenchymal tissue with an inner necrotic zone, a middle fibrous and plasmacytic zone and an outer zone of granulation tissue. With the gradual absorption of the dead parasite the reaction becomes more marked and ultimately a fibrous scar is formed especially in the brain. Calcification of cerebral cysts is not very common.

"In the brain, this mesenchymal capsule is surrounded by an area of gliosis where the nerve cells have undergone degeneration.

"The formation of multiple scars in the brain and the overlying meninges is put forward as the main pathological basis of the nervous symptoms."

C. L.

TIMPANO (P.). L'anchilostomiasi. (Rilievi clinici e di laboratorio.) [**Ankylostomiasis: Clinical and Laboratory Findings.**]—*Policlinico.* Sez. Prat. 1939. Aug. 14. Vol. 46. No. 33. pp. 1455–1461.

Remarks based on experience with 1,165 cases. Most of what is noted here is part of the common knowledge of the infection. An unexpected statement is that in direct examination of faeces for infection enough must be taken to detect eggs or larvae of the worm. In answer to his own question whether *N. americanus* exists in Italy the author reports finding it on two occasions. *C. L.*

BRUNI (Augusto). Il fattore di diffusione nell'ankylostoma duodenale. [**The Factor of Diffusion in** *A. duodenale.*]—*Settimana Med.* Palermo (formerly *Riv. Sanitaria Siciliana*). 1939. Sept. 14. Vol. 27. No. 37. pp. 1105–1106.

There exists in *A. duodenale* an active diffusion factor.

These parasites were obtained by anthelmintic from man, the worms picked from the fresh stool, washed in normal saline, soaked for some hours in 0·5 per cent. phenol in normal saline, thoroughly washed in normal saline, ground up in normal saline, the suspension centrifuged and the supernatant fluid injected under the skin of albino rabbits. When this fluid was first mixed with Chinese ink or with diphtheria toxin the evidence of diffusion was considerably greater than when these substances were injected after mixing with the same quantity of normal saline. It is concluded that hookworm anaemia is not due to loss of blood but to a toxin in the parasite. [For evidence of loss of blood see FÜLLEBORN and KIKUTH, this *Bulletin*, 1931, Vol. 28, p. 234; WELLS, 1932, Vol. 29, p. 421.] *C. L.*

ROGERS (W. P.). **The Physiological Ageing of Ancylostome Larvae.**—*Jl. Helminthology.* 1939. Dec. Vol. 17. No. 4. pp. 195–202. With 2 figs. & 2 graphs.

HOFF (Hans) & SHABY (J. A.). **Nervous Complications in Ankylostomiasis.**—*Jl. Trop. Med. & Hyg.* 1939. Dec. 1. Vol. 42. No. 23. pp. 360–362.

"Three cases of subacute combined degeneration of the cord caused by severe secondary anaemia due to infestation with *Ancylostoma duodenale* have been described.

"Treatment was given successfully by a combination of iron, liver extract and vitamin B_1 and later the Ancylostoma removed."

ZAINAL, STREEF (G. M.) & STREEF-SPAAN (A. M.). Eiwitspectrum en oedeem bij de ankylostomiasis. [**The Relation of Albumin to Hookworm Oedema.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1940. Jan. 2. Vol. 80. No. 1. pp. 3–22. [23 refs.] English summary.

"The investigation of the protein fractions in the plasma and oedema of patients with ankylostomiasis has taught us the following:—

"1. The total percentage of plasma protein was found to be distinctly decreased with the greater part of the 29 patients.

"2. The concentration of albumin proved to be distinctly lowered in the greater part of the cases. *This decrease was found with all oedematous patients.*

" 3. The globulin fraction showed a distinct increase with the greater part of the patients. This is especially the case with oedematous patients.

" 4. The reduction of the total percentage of protein was exclusively attributed to the decrease of the concentration of albumin.

" 5. The percentage of fibrinogen was found to be normal with nearly all patients, either with or without oedema.

" 6. The albumin globulin quotient was found to be distinctly decreased in by far the greater part of the cases. This was especially applicable to persons with oedema. Further nearly all oedematous patients had a quotient smaller than one. With these persons therefore a total reversion of the ratio took place.

" 7. The percentage of non-protein nitrogen was found to be normal with the greater part of the patients.

" 8. The oncotic pressure proved to be distinctly decreased with by far the greater part of the patients examined. This decrease occurred with all oedematous patients, with whom as a rule the pressure was also lower than the critical value of 30 cm. water.

" 9. It was supposed that the oedema with the ankylostomiasis patients examined was caused by a reduction of the colloid-osmotic pressure, which decrease was brought about by a decrease of the percentage of albumin.

" 10. Finally the possibility was suggested that the decrease of the albumin fraction with the ankylostomiasis patients examined was the consequence of a shortage of protein in the food, while an insufficient absorption of this from the intestines might play a part as well.

Conclusion.

" With reference to the cause of the oedemata in case of ankylostomiasis we conclude that these oedemata are the consequence of an obvious decrease of the albumin fraction of the plasma with its attendant decrease of the colloid-osmotic or oncotic pressure."

Otto (G. F.). **A Serum Antibody in Dogs actively immunized against the Hookworm,** *Ancylostoma caninum.*—*Amer. Jl. Hyg.* 1940. Mar. Vol. 31. No. 2. Sect. D. pp. 23–27.

" Experiments appear to demonstrate that the serum of dogs actively immunized by repeated infection, contains an antibody of considerable potency against the hookworm larvae. The phenomenon seems to be essentially the same as that reported by Sarles in his studies on *Nippostrongylus muris* . . . . . These experiments do add more specific substance to the already available evidence that the phenomenon of specific acquired immunity plays an active rôle in the host control of canine hookworm infection. Furthermore, they add to the rapidly accumulating evidence that consideration must be given to this same phenomenon in our study of human hookworm disease."

Shute (D. S.). **Ankylostomiasis—a Misleading Case.**—*Jl. Roy. Nav. Med. Serv.* 1939. Oct. Vol. 25. No. 4. pp. 422–423. With 1 chart.

Otto (G. F.) & Landsberg (J. W.). **Dietary Deficiencies and Iron Salts in Hookworm Infections.**—*Amer. Jl. Hyg.* 1940. Mar. Vol. 31. No. 2. Sect. D. pp. 37–47. With 1 graph. [18 refs.]

" In two experiments involving seventeen dogs large amounts of iron were added to the diet of seven of the fifteen animals maintained on a

generally deficient diet preceding and during hookworm infection. The additional iron stimulated a marked but apparently transient erythropoiesis; it had no effect upon the development or persistence of the worms. Likewise it did not in any way prevent or delay the development of fatal anemia. It is concluded that a balanced and adequate diet is of more fundamental importance than iron therapy but iron therapy may well supplement general dietary improvements and removal of the worms with an anthelmintic."

[The References are exclusively American. In the article on Hookworm Anaemia (this *Bulletin*, 1937, Vol. 34, p. 1) occurs this passage, based on WITTS' Goulstonian Lectures of 1932 and on Janet VAUGHAN's *The Anaemias* (1934), and referring to the erythron and haemopoiesis.

" Before any cell of this series is able to undergo development it has to take up into itself a special substance coming to the body with the food, a different one for every stage. There is little knowledge of that needed for the change from reticulo-endothelium to megaloblast. For that from megaloblast to erythroblast, the substance for special note here, the ' haemopoietic factor ' of Castle, comes to the marrow from the liver, and though stored in the liver it is made in the stomach, seemingly in this way. An enzyme, named haemopoietin or ' intrinsic factor,' is normally present in the secretion of the stomach; it comes into operation there with some substance in protein food, named ' extrinsic factor,' to make the ' haemopoietic factor.' This last gets into the body at any point in the wall of the small intestine, after which it is stored in the liver till the marrow has need of it. For the change from erythroblast to erythrocyte the substance, needing special note here, is iron."]

C. L.

HADDAD (E.). Biologie systématique et thérapeutique de l'infestation helminthiasique au Kwango. [**Systematic Biology and Treatment in Worm Infections at Kwango.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. Dec. 31. Vol. 19. No. 4. pp. 539–544. [11 refs.]

In 500 faecal examinations of pensioners and children (the technique is unstated) the percentages of infection found were: Hookworm 50·4, Ascaris 40·4, Strongyloides 1·8, Trichuris 0·4, Trichomonas 1·8, Balantidium 0·2, not infected 18. In 190 examinations in a village the corresponding percentages for worms were 23·2, 72·6, 3·1 and 4·7, not infected 7·9. In 18 sick with avitaminosis they were 44·4, 33·3 and 11·1, no Trichuris eggs being found and 22·2 being negative.

Treatment was given in these doses to a man of 60 kgm., with a saline purge an hour or two later; when dosage was divided as shown by the multiplication sign the intervals were 15 minutes. Hookworms: essence of chenopodium 3×15 drops to 80 patients with a cure percentage of 90; carbon tetrachloride 3 cc. to 52 with a cure rate of 81·2, chloroform 6×0·5 gram 40, 80; thymol 6×0·5 gram (no mention is made of particulation) 156, 74·3; chloroform 4×0·5 gram 20, 60; beta naphthol 6×0·5 gram 8, 36. Ascaris: santonin 0·15 gram given to 150 with 86 per cent. of cures; chloroform 6×0·5 gram 75, 84; essence of chenopodium 3×15 drops 180, 77·7; carbon tetrachloride 3 cc. 52, 61·5; thymol 6×0·5 gram (particulation unmentioned) 60, 60. Chloroform 4×0·5 gram 30, 43·3, beta naphthol 6×0·5 gram 20, 40. Trichuris: chloroform 6×0·5 gram 6 treated, 50 per cent. cured; beta naphthol 6×0·5 gram 16, 75. *C. L.*

i. Cavallero (Cesare). Etude de la cirrhose expérimentale par le tétrachlorure de carbone à l'aide de la réaction stathmocinétique (colchicinique) de Dustin. [**Experimental Cirrhosis caused by Carbon Tetrachloride and measured by Dustin's Colchicine Reaction.**]—*Arch. Internat. Méd. Expérim.* 1939. Dec. Vol. 14. No. 1. pp. 1–14. With 2 figs. [12 refs.]

ii. ——. Réactions hormonales au cours de l'intoxication par le tétrachlorure de carbone, poison cirrhogène, mises en évidence par la méthode stathmocinétique (colchicinique) de Dustin. [**Hormone Reactions in Poisoning by Carbon Tetrachloride in its Fibrogenetic Action, measured by Dustin's Colchicine Method.**]—*Ibid.* pp. 15–22. With 2 figs. [16 refs.]

i. Since the cirrhosis induced in this study was brought about by carbon tetrachloride the paper has an interest in helminthological medicine.

The animals used were male white rats weighing between 100 and 150 gm. All were given carbon tetrachloride by inhalation for 30 minutes, either once only, in which case the condition is described as acute, or repeatedly for 15 consecutive days, in which case it is spoken of as chronic. To some of the acute and to some of the chronic poisonings colchicine was given by injection, to the rest who acted as controls it was not. There are then four series to consider.

Colchicine excites mitosis ; Dustin's method is to inject this at the rate of 25γ per 40 grams of body weight and to measure its efficacy by counts of the numbers of mitotic figures present per field of sections 7μ thick cut from organs that have been fixed in the author's chromo-aceto-formol, embedded in paraffin and stained in Masson's trichrome reagent. The findings were these :—

Liver.—With acute poisoning, and no colchicine, there is at once a spacing of the columns of true liver cells with hypertrophy of the Kupfer cells that lie in these spaces. It is at its maximum, 1·1 mitosis per field, immediately after treatment and endures for 2 to 5 days only. From the fourth to the 24th hour the liver cells become vacuolated, fatty, homogeneous or necrosed and from the 12th to the 72nd hour macrophages begin to absorb them, and by the 5th day fibrosis begins in portal and intralobular spaces.

With acute poisoning and colchicine, increased mitosis of the liver cells appears 3 days after treatment and almost exclusively at the periphery of the lobule, and disappears next day. In the Kupfer cells the maximum mitosis appears immediately after the suspension of treatment (presumably that with carbon tetrachloride) and is present throughout the lobule. Numbers do not appear to be stated.

With chronic poisoning and no colchicine the degeneration and necrosis of liver cells is most marked in what is called the middle of the lobule, phagocytosis occurs where these changes are greatest, fibrosis sets in, and mitosis in both elements is present. With chronic poisoning and colchicine the changes are as those in acute poisoning.

In the spleen it appears that in normal rats colchicine causes 43 mitoses per field of the pulp and an unmeasured activity in the follicles. After carbon tetrachloride, acute or chronic, the mitosis in the follicles is as above, in the pulp it is sharply increased.

In lymph nodes, kidney and pancreas there is an increase of mitosis after colchicine in the first few hours only.

ii. The changes observed in the parathyroid, suprarenal, hypophysis and islands of Langerhans seem to have no special bearing on helminthological medicine. *C. L.*

HARE (K. P.). **An Experiment in Coolie Line Sanitation. Effect on Hookworm Incidence.**—*Indian Med. Gaz.* 1940. Feb. Vol. 75. No. 2. pp. 86–88.

The author has previously described the installation of a bore-hole latrine, one for each family, in the coolie lines of an estate in Assam [this *Bulletin*, 1939, Vol. 36, p. 508]. These have proved so successful that several hundreds are now in existence in the neighbourhood. To assess their value in the prevention of hookworm disease he has made stool surveys and has employed as a control another coolie line. The technique of the stool surveys was the same in all cases. In the control line the infection rates in March 1938, November 1938 and March 1939 were 86·6, 83·2 and 84·7 per cent.; in the line supplied with latrines they were in November 1938 and March 1939, 81·7 and 73·3 per cent. and the impression from stool examinations was that the infections in this line had become much lighter. Single dose treatment with tetrachlorethylene had been given to these people and calculating on the basis of observed cures by this method [this *Bulletin*, 1940, Vol. 37, p. 69] the author concludes that reinfection is occurring in both lines, but not at so rapid a rate in the lines provided with latrines. Reinfection occurs in the fields and houses and not in the latrines and the larvae will therefore gradually die out. The author thinks that the provision of these cheap latrines will reduce hookworm infection to an innocuous level.

He also quotes figures which suggest that the provision of latrines has had a beneficial effect in reducing the incidence of dysentery, which had already been reduced by the installation of a pure water supply. *C. W.*

ABBADIE (Alberto Urribarri). Uncinariosis. Su profilaxis desde la escuela. [**The School and the Prevention of Hookworm Infection.**] —*Prensa Méd. Argentina.* 1939. Oct. 4. Vol. 26. No. 40. pp. 1942–1944.

The advice covers the usual lines—treatment, construction and use of latrines, the wearing and renewal of footgear, and sanitary teaching. The attitude to the latrine is shown by one child's surprised question—Why should I go into a small room to empty my belly when I have the whole country to do it in? *C. L.*

DUVOIR (M.), POLLET (L.), BRUMPT (L. C.) & CHÉNEBAULT (J.). Un cas de polyglobulie traité par ankylostomose provoquée. (Résultats favorables sur la polyglobulie et sur l'hypertension artérielle.) [**Polycythaemia treated by infecting the Patient with Hookworms. Reduction of Polycythaemia and Arterial Tension.**] —*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1940. Mar. 15. 56th Year. 3rd Ser. Nos. 4–5–6. pp. 42–45.

A woman of 67 had 7,860,000 red and 9,900 white cells, and there were 41 per cent. of normoblasts in the marrow. The red cells rose to 8,250,000. She developed a right hemiplegia with aphasia and a

haemoptysis. The red cells then fell to 7,300,000. Infective hookworm larvae were applied to the skin of the thigh, apparently 300 on each of two consecutive days, and about 40 days later the eggs appeared in the stools and in 45 days later the red cells had fallen to 3,570,000 and the haemoglobin to 80. Some of the worms were expelled by thymol and oil of chenopodium with marked benefit, but in 4 months the red cells had risen to 6,000,000 when she left observation; but she returned some months later with the number of red cells 7,000,000 and haemoglobin 130 and it was calculated that the number of worms was about 200. *C. L.*

Roberts (F. H. S.). **Notes on Some Helminths infesting Domestic Animals in Queensland.**—*Australian Vet. Jl.* 1940. Feb. Vol. 16. No. 1. pp. 30–33. [16 refs.]

Of interest in human medicine is a record of three specimens identified as *Necator suillus* and not as *N. americanus* from the pig, and of *Trichostrongylus colubriformis* from the same host species.

C. L.

Galvão (A. L.) & Do Amaral (A. D. Franco). Dermatite linear serpiginosa das praias do litoral paulista. [**Linear Serpigenous Dermatitis in Dogs of the Paulista Coast.**]—*Arquivos de Higiene e Saúde Pública.* São Paulo. 1939. Sept. Vol. 4. No. 7. pp. 75–84. With 11 figs. on 6 plates. [13 refs.] English summary (8 lines).

The authors conclude that the local cause of this condition is the larva of *A. braziliense* spread by dogs and cats, domestic and wild.

C. L.

Nakaoka (Kuniharu). Beiträge zur Kenntniss ueber den Einfluss der ultravioletten Strahlen (3900Å–2900Å) auf der Lebewesen. Versuch I. Ueber den Einfluss auf das Wachstum der Nematoda-Eier. [**The Influence of Ultraviolet Light on the Growth of Nematode Eggs.**]—*Sei-I-Kai Med. Jl.* 1939. Aug. Vol. 58. No. 8. [In Japanese pp. 1195–1238. [16 refs.] German summary pp. 1–2.]

MALARIA.

Précis of Abstracts in this Section.

Hausser (p. 598) discusses malaria as an occupational disease in France.

Strickland (p. 599) shows that the reason for the high malaria incidence in the valleys below the Chota Nagpur plateau is that in the dry season there are innumerable pools, suitable for Anopheles breeding, left in the course of the swift-flowing streams. Montel and Do-van-Hoanh (p. 599) discuss malaria in Saigon, in the native quarters of which town it is a serious cause of sickness and death.

Treillard (p. 599) discusses the biotype of *A. maculipennis* known as *cambournaci* which he states is to be found in Portugal.

Miyahara (p. 600) describes a method for quick staining of haemolysed blood with Giemsa's stain diluted in a warm dilute solution of K_2CO_3.

Joelsas (p. 600) has observed, in association with malaria, nervous symptoms which he groups in two classes: acute forms occurring during the attack, and late post-malarial forms. He does not consider that mechanical and toxic action is a satisfactory explanation, but thinks it possible that endothelial [or exo-erythrocytic] forms of the parasite may play a part.

Morishita (p. 601) states the principles on which the specific drug treatment of latent malaria should be conducted. Adrenalin is useful in causing reappearance of parasites in the blood. De (p. 601) treats malaria of the choleraic type by intravenous saline into which is introduced quinine solution. Coppola (p. 601) quotes evidence which supports the view that variations in the bilirubin content of the blood are more likely to be caused by malaria infection than by any possible haemolytic action of quinine. There was no evidence that quinine influences the normal process of haemolysis.

Kerbosch (p. 602) discusses the cultivation of cinchona and the question of world supplies and prices.

Pizzillo (p. 602) reports complete cure in 57 patients treated by the Ascoli method during primary attacks of malaria and re-examined 7 to 20 months later.

Junge (p. 603) quotes his observations which indicate that the best prophylactic measure with atebrin, in Europeans in W. Africa, is the daily administration of 0·05 gm. This is effective, and the yellow coloration of the skin is not so great as with larger doses. *C. W.*

Kasauli. **Annual Report of the Malaria Institute of India for the Year 1938** [Covell (G.), Director].—18 pp. 1939. New Delhi: Government of India Press. [Re.1 As.6 or 2*s*.]

This is the first annual report of the activities of what was the Malaria Survey of India under its new title Malaria Institute of India, a title that it assumed in April 1938 [see this *Bulletin* 1938, Vol. 35, p. 724]. Under its new title, which more adequately describes its functions, it is carrying on its advisory, research and educational activities. Its headquarters remain at Kasauli but the field station has been transferred from Karnal to more commodious and much more accessible premises in Delhi. The report briefly describes the field and laboratory researches and investigations that have been carried out. The more important of these are made the subjects of reports published in the Journal of the Institute which are summarized from time to time in this *Bulletin*. *Norman White.*

Hausser (Guy). Paludisme, maladie professionnelle. [**Malaria as an Occupational Disease.**]—*Rev. du Paludisme et de Méd. Trop.* Paris. 1939. Dec. 15. Vol. 1. No. 6. pp. 177–183.

In Italy and in Brazil malaria is included in the list of occupational diseases, in labour legislation, for certain occupations. No such legislation concerning malaria exists in France, but the author considers the modifications and additions to existing legislation which might be necessary were it decided to treat malaria, acquired in special conditions, as an occupational hazard, entitling the victim to compensation. No

case is made out for the need of any such legislation and it is not evident why the paper should have been written and published at the present time. *N. W.*

STRICKLAND (C.). **Malaria in Chota Nagpur.**—*Indian Med. Gaz.* 1939. Dec. Vol. 74. No. 12. pp. 737–740. With 4 figs.

The Chota Nagpur plateau, at an elevation of about 2,000 feet, is mildly malarious. On the other hand the villages on the *ghats*, the scarp of the hills and the steep valleys approaching the plateau, are extremely malarious. Physiography accounts for the difference. The streams flow fast down the rocky channels of the ghats, leaving in the fair season innumerable shallow pools which are ideal for the development of mosquitoes. On the plateau mosquito-breeding places in the sandy river-beds are few and far between, and are readily accessible to fish. More frequent deviation of anophelines by domestic animals on the plateau may also be a factor of importance. The climate on the plateau is optimal for malaria-genesis. *N. W.*

MONTEL (M. L. R.) & DO-VAN-HOANH. Le paludisme à Saigon. [**Malaria in Saigon.**]—*Rev. Méd. Française d'Extrême-Orient.* 1939. Aug.–Sept. No. 7. pp. 833–842.

The authors, on the basis of prolonged clinical experience, combat the view that has been put forward, as the result of epidemiological enquiries, that endemic malaria is of little or no importance in Saigon. This is true for the urbanized European part of the town, but in the poorer native quarters, where sanitary conditions are deplorable, malaria is a serious cause of sickness and death. To meet the criticism made by the epidemiologist that little reliance can be placed on dispensary clinical diagnoses of malaria, blood smears of all cases diagnosed as malaria at a Municipal Dispensary during the first ten days of February were examined at the local Pasteur Institute. There were 168 such cases among a total attendance of 560; malaria parasites were found in 104. This is a high proportion in view of the fact that all the patients were sufficiently well to visit the dispensary as out-patients. *P. vivax* was found in 52, *P. falciparum* in 42, and *P. malariae* in 10 [see this *Bulletin*, 1939, Vol. 36, p. 679]. *N. W.*

TREILLARD (M.). Au sujet d'une variété méridionale de l'*Anopheles maculipennis*. [**A Southern Variety of** *A. maculipennis*.]—*Bull. Soc. Path. Exot.* 1939. Dec. 13. Vol. 32. No. 10. pp. 934–936.

The biotype of *A. maculipennis* named *cambournaci*, hitherto noted only in Portugal and in Camargue, at the mouth of the Rhone, was first described by the author in conjunction with ROUBAUD [see this *Bulletin*, 1937, Vol. 34, p. 633; 1938, Vol. 35, p. 139]. Subsequent continued observations have enabled the author to determine the permanence of the characteristics determining this biotype. He therefore expresses surprise at a statement made by CAMBOURNAC and HILL to the Third International Congress of Tropical Medicine to the effect that only the classic *A. maculipennis* var. *atroparvus* is found in the very part of Portugal from which originated the first strain of the *cambournaci* biotype described. He is convinced that breeding in series from eggs with the characteristic short floats would reveal the continued presence of the biotype. *N. W.*

MIYAHARA (Hatuo). **The Quick Staining Method of the Malaria Parasite by Means of Giemsa's Stain.**—*Acta Japonica Med. Trop.* Formosa. 1939. May. Vol. 1. No. 1. pp. 49–55. With 6 figs. on 1 plate.

The author claims that his quick method of Giemsa staining has distinct advantages over other quick staining methods. The film is not fixed with methyl alcohol: the dried film is haemolysed in a beaker of water, the side of the slide containing the film being first marked. The solvent of the stain, 0·003–0·005 per cent. K_2CO_3 or Na_2CO_3 solution, is heated to about 60°C. One drop of Giemsa stain is added to each cc. of the heated solvent. About 3 cc. of the warm solution is poured on the film and left 5 to 10 minutes: the film is then washed with water and dried. Schüffner's dots are well stained but they appear finer than they do after alcohol fixation. The parasitized cells and the parasites are well stained and their detection is facilitated. No stain granules are deposited on the film. Indifferently prepared films are not a serious drawback after haemolysis. *N. W.*

JOELSAS (Mejeris). Die Beziehung der Malaria zum Nervensystem. [**Relation of Malaria to the Nervous System.**]—*Schweiz. Med. Woch.* 1940. Feb. 10 & 17. Vol. 70. Nos. 6 & 7. pp. 123–124; 145–148. [66 refs.]

After a short introduction the author gives a survey of the literature of the subject. He brings out an interesting point, namely, that in the last war, in the so-called "war malaria" cases neurological complications took the most important place.

His own observations were carried out at the Malaria Research Station at Rosh-Pina, Palestine. He describes 10 cases of malaria, chiefly malignant tertian, in which nerve complications were present. The 10 cases were only a small fraction of those investigated and treated at the Station.

He classifies the disturbances of the nervous system in malaria into two main groups, viz., acute, during the attack; and late forms or post-malarial disturbances of nervous system. In the first group the following symptoms, either alone or combined, may occur: headache, delirium, stupor, coma, epileptic convulsions, tetanic contractions, cerebral, bulbar, and medullary symptoms, both encephalitic and meningeal forms. In the second group the following disturbances of the nervous system are listed: neurasthenia, hysteria, psychosis, neuralgia, neuritis, polyneuritis, spinal and peripheral types, vegetative endocrine types and mixed forms.

As regards the explanation of these disturbances he does not consider that the mechanical-toxic action of the malarial parasites is a satisfactory explanation. He refers to the work of James and others on the endothelial forms of the parasite, so-called E forms. He states that the relation of these endothelial forms to the aetiology of relapse and neurological disturbances in malaria is not yet clear, but he inclines to the opinion that their influence, particularly on the early and post-malarial neurological disturbances, is of great significance.

E. D. W. Greig.

Saǧlam (Tevfik). Tetanusähnlicher Symptomenkomplex als Äquivalent des Malariaanfalls. [**Symptoms resembling Tetanus in Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1939. Oct. Vol. 43. No. 10. pp. 458–463.

Thonnard-Neumann (E.). Ueber einen Fall von Agranulozytose im Gefolge von Malaria Tropica. [**Agranulocytosis accompanying Subtertian Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1939. Oct. Vol. 43. No. 10. pp. 453–458. [14 refs.]

Greig (E. D. W.), assisted by Alexander Neill. **Observations on the Maximum Parasite Rate in Cases of Induced Malaria.**—*Jl. Trop. Med. & Hyg.* 1939. Dec. 15. Vol. 42. No. 24. pp. 378–381. With 2 charts.

Morishita (Kaoru). **Some Observations on the Behaviour of the Parasites during Latent Malaria Infection.**—*Acta Japonica Med. Trop.* Formosa. 1939. May. Vol. 1. No. 1. pp. 37–48. [16 refs.]

The author discusses the importance of latent malaria infections and the difficulties of its diagnosis and treatment. He believes that the parasites in latent infections may be attacked by drugs if these are selected with due regard to their species-specificity. In cases of mixed infection treated with cinchona alkaloids or atebrin nearly all relapses are caused by *P. vivax*: in cases treated with plasmoquine nearly all relapses are due to *P. falciparum*. In cases in which parasites have disappeared either spontaneously or as the result of inadequate treatment the injection of adrenalin is of use in causing their re-appearance. The chance of detecting parasites in the blood is greatest within the thirty minutes following the injection and the maximum number of such parasites occurs within this period. If a single examination only is possible the film should be made 30 minutes after the injection. *N. W.*

De (R. K.). **A Simple Technique of giving Intravenous Quinine with Saline.**—*Indian Med. Gaz.* 1939. Dec. Vol. 74. No. 12. p. 740.

In the treatment of cases of malaria of a choleraic type the author combines quinine treatment with intravenous saline infusion. A solution of quinine is injected into the rubber tube connecting the saline funnel and the needle while the saline is flowing into a vein.

N. W.

Coppola (Massimo Acquaviva). Osservazioni sulla bilirubinemia nei malarici. [**Bilirubinaemia in Malaria.**]—*Riv. di Malariologia.* Sez. I. 1939. Vol. 18. No. 6. pp. 329–336. [31 refs.] English summary (3 lines).

Individual idiosyncrasies and unusual responses to the administration of quinine prompted the author's observations in a series of cases of chronic malaria. Haemolysis and bilirubinaemia are interdependent: estimation of the bilirubin content of the serum was made. In 13 cases the estimation was made 3 to 4 weeks after the completion of a course of quinine treatment: in 9 other cases the estimations were made immediately after the completion of a ten-day course of quinine in

doses of from 1 to 3 gm. a day. Three others were cases of chronic malaria that showed signs of quinine intolerance. In four other cases of chronic malaria estimations were made before and after the administration of quinine; in two of these a noteworthy fall in the bilirubin content was noted in the second observation. The observations lend support to the view that variations in bilirubin content of the blood are more likely to be caused by the malaria infection than by any possible haemolytic action of quinine; there was no evidence that quinine influences the normal process of haemolysis. *N. W.*

KERBOSCH (M.). **Some Notes on Cinchona Culture and the World Consumption of Quinine.**—*Bull. Colonial Inst. Amsterdam.* 1939. Dec. Vol. 3. No. 1. pp. 36–51. With 4 plates.

This account of the present position of the cinchona industry, is coupled with the history of cinchona culture in Java, Ceylon and India and a consideration of future increased production to meet all probable future increased demands. The facts, which are well known, are very well presented. In 1913 the cinchona bark producers of Java made an agreement with quinine manufacturers by which the supply and sale of cinchona bark were adjusted to the world consumption of the drug. The Java cinchona plantations could produce a very much greater quantity of bark than is harvested now. The author realizes that the world's need for quinine is not the same thing as the world's demand for the drug, but he combats the prevalent idea that the high price of the drug is an important factor in limiting consumption. In 1933 the official price of quinine was decreased 25 per cent. but this reduction was followed by no material increase in consumption. Retail prices of the drug are but little affected by wholesale fluctuations in the price of bark. Governments that purchase quinine for free distribution are generally furnished with the drug at rates lower than market price. The cost of quinine is not a very large item in comparison with the cost of an efficient anti-malaria organization which supervises its distribution. The Netherlands Indies Government has sufficient guarantees that the agreement of 1913 should not be used in such a way to hamper malaria control. Cinchona growers would welcome the opportunity to increase their output, and so carry on their business in more normal conditions. *N. W.*

PIZZILLO (Giuseppe). Risultati a distanza nelle primoinfezioni malariche trattate con la cura adrenalinica venosa. [**Late Results of Primary Malaria Infections treated with Intravenous Adrenalin Injections.**]—*Riv. di Malariologia.* Sez. I. 1939. Vol. 18. No. 6. pp. 361–373. German summary.

The author reports on the condition of 57 patients whose primary attacks of malaria, from 7 to 20 months previously, had been treated with intravenous injections of adrenalin. Thirty-eight of these patients had had *P. falciparum* infections. The state of health of all 57 patients was excellent; blood counts were normal; none harboured parasites; none had suffered from any relapse, and in none was there any splenic enlargement. Henry's reaction was negative in every case. *N. W.*

JUNGE (Werner). Zur Dauerverträglichkeit und Dosierung der Atebrin-Prophylaxe. [**The Tolerance and Dosage of Atebrin as a Prophylactic.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1939. Sept. Vol. 43. No. 9. pp. 409–411.

The author has observed 20 Europeans in Liberia who have taken atebrin as a prophylactic over a period of 7 years. Altogether each adult took 143 gm. during the period and no injury to health which could be attributed to atebrin was observed; even when intestinal or gastric trouble occurred there were other causes, for instance errors in diet or hookworm disease. The condition of the blood remains normal and pregnancy and parturition are not affected. Yellow coloration of the skin is constant.

In one patient who had taken prophylactic atebrin for six years an attack of malaria occurred which could not be controlled by therapeutic doses by the mouth, but injections proved effective.

The prophylactic dose at first given was 0·1 gm. daily. This was effective but produced intense yellow coloration of the skin. The dose was therefore reduced to 0·05 gm. daily, and the yellow coloration, though slighter, was still apparent. No malaria was seen during 3½ years under this dosage. For 1½ years the dose was reduced to 0·3 gm. given on one day each week, but this was insufficient, as four-fifths of the persons suffered severe attacks of quartan or subtertian malaria. The best prophylactic measure with atebrin, therefore, appears to be the daily administration of 0·05 gm. *C. W.*

REVIEWS AND NOTICES.

ROGERS (Leonard) [K.C.S.I., C.I.E., M.D., F.R.C.P., F.R.C.S., F.R.S., I.M.S. (retd.), etc.] & MUIR (Ernest) [C.I.E., M.D., F.R.C.S. Edinburgh, Medical Secretary, British Empire Leprosy Relief Association, etc.]. **Leprosy.** 2nd Edition.—pp. xii+260. With 81 figs. (71 on 34 plates & 2 maps). 1940. Bristol: John Wright & Sons, Ltd. London: Simpkin Marshall Ltd. [15*s.*]

The appearance of a new edition of Rogers and Muir's book on leprosy is an important event in tropical medicine.

In their preface the authors state that the period of fifteen years since the publication of the first edition "has been one of unexampled progress in our knowledge of leprosy."

They might have added that even greater progress has been made in the spread of knowledge of the disease among the medical profession and the educated public. Indeed the outlook on leprosy has undergone a revolution and the authors might justly claim to have been the leaders of a movement which has brought hope to the leper and courage to his doctor.

The volume contains abundant evidence of the truth of the statement in the preface that "the authors have embodied extensive studies of published works and have used the prolonged clinical experience gained by one of them in India and in recent tours made in Africa on behalf of the British Empire Leprosy Relief Association."

It might seem, at first sight, that an undue proportion of the book has been devoted to the broader aspects of leprosy, as nearly half of the text deals with the history, distribution, epidemiology, communicability and general principles of prophylaxis of the disease: but these matters are treated in so masterly a manner that no reader would

wish this part of the book to be curtailed by a single page ; even the layman will be fascinated by the clear and vivid account which is given of leprosy through the ages and throughout the world.

These chapters also form an essential preliminary to the proper grasp of the remaining chapters, which contain a concise account of the aetiology, prevention and clinical aspects of the disease, including the modern methods of treatment.

Despite the fact that the book is essentially a practical guide to the diagnosis, treatment and prevention of leprosy many readers will feel disappointed that the authors have said so little about the part which they have played in the initiation and popularization of the methods of treatment and prevention which are now adopted by the great majority of medical men in the countries where leprosy exists.

The most critical reader will fail to find the slightest support for the suggestion formerly made by some workers that Rogers and Muir make exaggerated claims for the results obtained by modern drug treatment of leprosy : on the contrary they emphasize the limitations of the special remedies and insist on the great importance of building up the resistance of the body by such means as diet, exercise and cheerful surroundings.

The chapter on modern prophylaxis is the most important in the whole book ; this gives in a few pages what every doctor and health worker ought to know about the control of the disease.

The segregation of all infective persons is naturally regarded as the ideal means of preventing the spread of leprosy, but at the same time it is made quite clear that compulsory isolation has been a failure in nearly all the countries in which it has been tried ; the reason being that it leads to the concealment of the disease during the stage of greatest infectivity.

Although the authors recognize the great differences which exist in various parts of the world and therefore dogmatize only on the basic principles of prevention, they hold that in most tropical countries the most successful method of controlling the disease is the " Propaganda-Treatment-Survey system " which was initiated by themselves.

Special stress is laid on the need for persuading patients to seek treatment as soon as signs of the disease appear so that the infectious stage may be prevented or shortened, also on the need for periodical examination of all who have come into close contact with infectious patients and on the importance of providing acceptable institutional treatment for all who cannot safely be treated as out-patients.

The classification of the types of leprosy follows the recommendations of the International Leprosy Congress held at Cairo in March 1938 ; it is to be hoped that this will be generally adopted by leprologists.

Eighty-one excellent illustrations are reproduced on 34 pages of art paper and these form a very valuable feature of the book whose general get-up is creditable to the publishers.

Altogether the book is a clear, concise and thoroughly reliable guide to every aspect of leprosy ; no doctor or sanitarian in the tropics will be able to regard himself as properly equipped for dealing with the disease until he has become familiar with the contents of this handy volume.

As has already been indicated the first half of the book will be found interesting and profitable by all educated laymen in countries where leprosy is a problem. *John W. D. Megaw.*

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